The Honors Program's
Center for Undergraduate Research Opportunities

CURO Symposium 2002
Program and Abstracts

CURO Office
203 Moore College
The University of Georgia
Athens, Georgia 30602
(706) 542-3240
CURO@uga.edu
http://www.uga.edu/honors/curo

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Table of Contents

CURO Symposium 2003

Center for Undergraduate Research Opportunities

University of Georgia, Tate Student Center
April 14-15, 2003

CALL FOR ABSTRACTS

The Center for Undergraduate Research Opportunities at the University of Georgia provides a forum for all undergraduates to present original research sponsored by faculty members. Undergraduate students from all disciplines are encouraged to participate. Representatives of public and private higher education institutions in Georgia are encouraged to apply.

Presentations may be in the form of an oral presentation, poster session, exhibition, performance, or work of art. Students can also present a tutorial about a research methodology or new technology. Undergraduate researchers who are at various stages of the research process are encouraged to submit abstracts describing where they are in the research process and the issues they face. Those who wish to present their work should submit an application located on the CURO Website, an abstract of a maximum of 250 words, and a brief supporting letter from the sponsoring faculty member no later than January 10, 2003. Group research projects should be submitted with one application and one letter of faculty support. All abstracts will receive student peer review with faculty guidance. All participants accepted into the symposium will be notified by February 14, 2003, and their abstracts will be published in a book of abstracts. Sponsoring faculty will be invited to preside at their students' sessions. Abstract submission is open to all undergraduate researchers.

Best Paper Awards
Papers on work being presented at the CURO symposium submitted by March 7, 2003 will be considered 'best paper' awards in humanities, sciences, and social sciences.

Purpose of the Symposium:
- Highlight excellence in research by undergraduate students.
- Enrich the undergraduate experience by promoting communication and cooperation between faculty and students.
- Inform undergraduates at the University of Georgia about the many existing opportunities available for collaboration with faculty to produce original research projects at the University of Georgia.
- Provide an opportunity for undergraduate researchers in the state of Georgia to engage with their peer researchers.

Criteria for Selection:
- Originality and quality of research.
- Quality of written abstract.
- Ethical and responsible research.
- Extent of involvement of the undergraduate student in the development of the research design and execution of the project. Research presented at the CURO Symposium should go beyond work completed for a class paper or project.
- A letter of support from supervising faculty.

This event will be free and open to the public. All interested faculty and students are encouraged to attend the CURO Symposium. For more information, contact Dr. Pamela B. Kleiber, Associate Director, Honors Program, 203 Moore College, Athens, Georgia, 30602, CURO@uga.edu, (706) 542-3240.

CURO 2002 Symposium at Glance

Monday, April 15, 2002

Concurrent Oral Sessions **9:05 a.m. -3:20 p.m.**
Tate Student Center Conference Rooms 138, 139, 140, 141, 142

Opening Sessions and Welcome **4:00 p.m.**
Tate Student Center, Georgia Room

Keynote Address **Dr. Steven Stice**
Georgia Research Alliance Eminent Scholar
Department of Animal and Dairy Science

A View from the Laboratory:
Scientific Possibilities and Ethical Restraint in Human Stem Cell Research

Reception and Poster Presentations **5:00 p.m. – 7:00 p.m.**
Sponsored by the Honors Program
Tate Center, Georgia Room

Tuesday, April 16, 2002

Visual and Performing Arts Presentations
Memorial Ballroom

Welcome **9:00 a.m.**

- **Gallery Talks**
- **Poetry Reading**
- **Dance Performances**
- **Musical Performances**

Closing Session
Memorial Ballroom

Reception sponsored by the Honors Program **3:30 p.m.**

Awards Ceremony **4:00 p.m. – 6:00 p.m.**

Evening Concert **8:00 p.m.**
Hodgson Hall

Monday, April 15, 2002

Concurrent Sessions
Tate Student Center Conference Rooms 138, 139, 140, 141, 142

9:05-9:55 a.m. **First Concurrent Session**

Room 138	**Siobahn Beaton**	Progress toward the Partial Purification of a Pectin Biosynthetic Gene
	Faculty Mentor	Dr. Debra Mohnen, Complex Carbohydrate Research Center, University of Georgia
	April Harper	Expression of Putative Arabidopsis UDP-Glucuronic Acid 4-Epimerase Genes
	Faculty Mentor	Dr. Debra Mohnen, Complex Carbohydrate Research Center, University of Georgia
	Donte Howard	Use of a Non-Radioactive Gel Assay to Assess whether Protein Purification Separates a Pectin Degradative Activity from the Pectin Biosynthetic Enzyme Alpha-1, 4-Galacturonosyltransferase
	Faculty Mentor	Dr. Debra Mohnen, Complex Carbohydrate Research Center, University of Georgia
Room 139	**Jacoby Hudson, Cassandra Kirkland, and Crystal Oliver**	Identifying Expressed Genes in Sorghum
	Faculty Mentors	Dr. Marie-Michèle Pratt and Dr. Lee Pratt, Department of Botany, University of Georgia
	Dipinder Singh Keer	An Online Analytical Processing Approach to Single Nucleotide Polymorphism Discovery and Analysis
	Faculty Mentors	Dr. Marie-Michèle Pratt, Dr. Chun Liang, and Dr. Lee Pratt, Department of Botany, and Dr. Mark Huber, Department of Management Information Systems, University of Georgia
	Dmitri Kolychev	Analysis of Microsatellites in Sorghum ESTs
	Faculty Mentors	Dr. Marie-Michèle Pratt, Dr. Lee Pratt, and Dr. Suchendra M.Bhandarkar, Department of Botany, University of Georgia
Room 140	**Eirin Kallestad**	It Was Broken, but They Did Not Fix It: Italian Election Reform in the Nineties
	Faculty Mentor	Dr. Christopher S. Allen, Department of Political Science, University of Georgia

	Matt Edwards	Evaluating the Moscow Center for Export Control's Role as a Non-Proliferation Epistemic Community Member
	Faculty Mentor	Dr. Gary Bertsch, Department of Political Science, University of Georgia

10:10-11:00 a.m. **Second Concurrent Session**

Room 138	**David Cureton**	Development of an *In Vitro* Packaging System for Streptomyces Bacteriophage
	Faculty Mentor	Dr. Janet Westpheling, Department of Genetics, University of Georgia
	Amanda Hudson	Screening Mutant Yeast Strains for Abnormalities in the Localization of snoRNA
	Faculty Mentor	Dr. Michael Terns, Department of Biochemistry and Molecular Biology, University of Georgia
Room 139	**Kristen Bryant**	Rapid Detection of *Salmonella* Using Three DNA Extraction Methods in Conjunction with Polymerase Chain Reaction
	Faculty Mentor	Dr. Susan Sanchez, Athens Diagnostic Laboratory, College of Veterinary Medicine, University of Georgia
	Quyen Dam	Clones of Resistant *Enterococcus faecium* Found in Humans and in Their Pets
	Faculty Mentor	Dr. Susan Sanchez, Athens Diagnostic Laboratory, College of Veterinary Medicine, University of Georgia
	Jessie Hopkins	Comparison of Several DNA Extraction Methods in Conjunction with PCR for the Rapid Detection of *Rhodococcus equi* and *Steptococcis equi*
	Faculty Mentor	Dr. Susan Sanchez, Athens Diagnostic Laboratory, College of Veterinary Medicine, University of Georgia
Room 140	**Lotus Seeley**	The Construction of the Lesbian Identity in the Undergraduate Classroom
	Faculty Mentor	Dr. Bonnie Dow, Women's Studies, University of Georgia
	Carrie Brooks	Reaching Across Cultures: An International Teaching Experience
	Faculty Mentor	Dr. Carole Henry, Art Education, University of Georgia
	Robert Brown	Risk/Resilience Systems and Child Behavioral Development
	Faculty Mentor	Dr. R. W. Kamphaus, Department of Educational Psychology, University of Georgia

Room 141	**Robin Seagraves**	New Balance Athens: "Endorsed by No One but Our Valued Customers"
	Faculty Mentor	Dr. Michael Lomax, Department of Physical Education and Sports Studies, University of Georgia
	Sara Smith	Optimization of Textural and Structural Properties of a Refrigerated Soy Based Dessert
	Faculty Mentor	Dr. Milena Corredig, Department of Food Science and Technology, University of Georgia
	Margaret Young	Adintern.com: A Website to Assist Advertising Focused Students in Finding, Getting, Keeping, and Leaving an Internship
	Faculty Mentor	Dr. Kirsten L. Strausbaugh, Department of Advertising/Public Relations, University of Georgia
Room 142	**Applying and Getting Accepted to the National Conference on Undergraduate Research (NCUR): A Panel**	
11:15 a.m.-12:05 p.m.	**Third Concurrent Session**	
Room 138	**Peter Harri**	Gene Expression in *Leishmania*: Control of Protein Synthesis in *Leishmania* 5' Untranslated Regions
	Faculty Mentor	Dr. Kojo Mensa-Wilmot, Department of Cellular Biology, University of Georgia
	Sharon Ballew	Bumblebee and Wildflower Species Associations
	Faculty Mentor	Dr. John Pickering, A & S Institute of Ecology, University of Georgia
	Amanda Casto	Analysis of the Role of the Protein Hfq in the Regulation of Polyadenylation in *Escherichia coli*
	Faculty Mentor	Dr. Sidney Kushner, Department of Genetics, University of Georgia
Room 139	**Jeff Halley**	Cell Wall-Degrading Enzymes from the Fungus That Causes the Devastating Rice Blast Disease
	Faculty Mentor	Dr. Sheng Cheng Wu, Department of Biochemistry and Molecular Biology, University of Georgia
	Lindsay Boozer	Lack of Utility of Creatinine Concentration for the Diagnosis of Feline Chronic Renal Insufficiency
	Faculty Mentors	Dr. Scott Brown, Department of Physiology and Pharmacology, University of Georgia
	Gregory Fonzo	The Effects of Exercise of Brain Derived Neurotrophic Factor
	Faculty Mentor	Dr. R. K. Dishman, Department of Exercise Science, University of Georgia

Room 140	**Heather Howdeshell**	Ceramic Analysis at Lake Springs (9Cb22): A Late Archaic Site of the Savannah River Valley
	Faculty Mentor	Dr. Mark Williams, Department of Anthropology, University of Georgia
	Crystal Leaver	Motivations of U.S. Southern Homegardeners: Preserving the Past in the Modern World
	Faculty Mentor	Dr. Virginia D. Nazarea, Department of Anthropology, University of Georgia
	Kathleen Teeples	Biometric Differences between Otoliths of Two Species of Sea Catfish
	Faculty Mentor	Dr. Elizabeth Reitz, Georgia Museum of Natural History, University of Georgia
Room 141	**Adam Cureton**	Differences in Cognitive Content between Propositions with Equivalent Referential Truth Conditions
	Faculty Mentor	Dr. Yuri Balashov, Department of Philosophy, University of Georgia
	Adam Cureton	Privacy as Autonomous Control of Personal Information
	Faculty Mentor	Dr. Clark Wolf, Department of Philosophy, University of Georgia
	Joshua Striker	Time and Myth: Literary/Philosophical Accounts/ Representations
	Faculty Mentor	Dr. Thomas Cerbu, Department of Comparative Literature Department, University of Georgia
Room 142	**Finding Opportunities for Extramural Undergraduate Research: A Panel**	
12:20 p.m. **1:10 p.m.**	**4th Concurrent Session**	
Room 138	**Claudia Vargas**	The Genomic Study of Multigene Families of *Pneumocystis carinii* for Potential Drug Targets
	Faculty Mentor	Dr. Jonathan Arnold, Department of Genetics, University of Georgia
	Kate Smith	Immunohistochemical (IHC) Detection of Natural Killer Cells in Fish
	Faculty Mentor	Dr. Kenneth S. Latimer, Department of Pathology, University of Georgia

	John Woodruff	The Generation of Mutations in the N-Terminal Region of the Protoporphyrinogen Oxidase of *Bacillus subtilis* to Create a Protein Capable of Mitochondrial Targeting in Mammalian Cells
	Faculty Mentor	Dr. Harry Dailey, Department of Microbiology, University of Georgia
Room 139	**Parul Shah**	Induction of Apoptosis by Rabies Virus Proteins
	Faculty Mentor	Dr. Zhen F. Fu, Department of Pathology, College of Veterinary Medicine, University of Georgia
	Jai Sikes	Developing a Sensor for Measuring Suspended-Sediment Concentrations
	Faculty Mentor	Dr. Bruce L. Upchurch, Department of Biological and Agricultural Engineering, University of Georgia
	Glorianne de Guzman and Joseph Moore	Application of Bioinformatics for Analysis of Sorghum ESTs
	Faculty Mentors	Dr. Marie-Michèle Pratt and Dr. Lee Pratt, Department of Botany, University of Georgia
Room 140	**Charlie Pitts**	Georgian Computer Usage
	Faculty Mentor	Dr. James Bason, Survey Research Center, University of Georgia
	Jennifer Byrne	An Assessment of Judicial Review and Judicial Behavior: The Factors That Influence the Supreme Court Decision Making Process
	Faculty Mentor	Dr. Stefanie Lindquist, Department of Political Science, University of Georgia
	Sayan De	The Progress and Modernization of Former East German Healthcare after Communism
	Faculty Mentor	Dr. Max Reinhart, Department of Germanic and Slavic Languages, University of Georgia
Room 141	**Andrew Littlejohn**	Ferdinand Warren: Artist, Craftsman, American Aristocrat
	Faculty Mentor	Dr. William Eiland, Georgia Museum of Art, University of Georgia
	Lorina Naci	"each morning I get up with one word in mind: plastik…"
	Faculty Mentor	Professor William Paul Jr., Drawing and Painting, School of Art, University of Georgia
	Lynn Nguyen	Chinese Classical Dance
	Faculty Mentor	Dr. Mark Wheeler, Department of Dance, University of Georgia

Room 142 **Association of Women in Science: A UGA Chapter Panel**

1:25 5th Concurrent Session
2:15

Room 138	**Chris Hartley**	Experimental Study of Male-Male Combat in a Parasitoid Wasp
	Faculty Mentor	Dr. Robert W. Matthews, Department of Entomology, University of Georgia
	Tricia Rodriguez	Amphibian Declines and the Frog Fungus Disease: Effects of Infection of Frog Eggs and Tadpoles
	Faculty Mentor	Dr. David Porter, Department of Botany, University of Georgia
	Buudoan V. Tran	Parameter Development and Application of the Glycam Force Field for Sialic Acid Derivatives
	Faculty Mentors	Dr. Karl N. Kirschner and Dr. Robert J. Woods, Complex Carbohydrate Research Center, University of Georgia
Room 139	**Kenneth Miller**	Synthesis and Use of Caged Compounds to Explore Cellular Processes
	Faculty Mentor	Dr. Timothy Dore, Department of Chemistry, University of Georgia
Room 140	**Chandler McClellan**	A Data Envelopment Analysis of the Efficiency of Georgia Politicians
	Faculty Mentor	Dr. David Mustard, Department of Economics, University of Georgia
	Jeffrey Pugh	Public Perception of "FONAG": An Ecuadorian Watershed Sustainability Program Case Study
	Faculty Mentor	Dr. Fausto Sarmiento, Center for Latin American and Caribbean Studies, University of Georgia
Room 141	**Julie Orlemanski**	In the Room: A Performative Text of Story, Poetics, and Criticism
	Faculty Mentor	Dr. Richard Menke, Department of English, University of Georgia
	Ben Emanuel	Shakespeare on Screen: Henry in Hollywood
	Faculty Mentor	Dr. Frances Teague, Department of English, University of Georgia
	John Stark	Friendship in the Age of Sensitivity: The Correspondence between Johann Wilhelm Ludwig Gleim and Johann Georg Jacobi
	Faculty Mentor	Dr. Mark Kagel, Department of Germanic and Slavic Languages, University of Georgia

Room 142 **Publishing as an Undergraduate Researcher: Editors of JURO@GA and The Undergraduate Science Bulletin (TSUB)**

2:30- 3:20 p.m. **6th Concurrent Session**

Room 138	**Marina Kozak**	Differential Glycosylation of Normal and Neoplastic hCG
	Faculty Mentor	Dr. J. David Puett, Department of Biochemistry and Molecular Biology, University of Georgia
	Eric Morishige	Transgenic Study of a Conserved Neuropeptide Network for Feeding Regulation in *Drosophila*
	Faculty Mentor	Dr. Ping Shen, Department of Cellular Biology, University of Georgia
	Alexandra Isabel Sahora	Cellular Tropism of an Undescribed Ehrlichia from White-Tailed Deer
	Faculty Mentors	Dr. William R. Davidson, Southeastern Cooperative Wildlife Disease Study (SCWDS), Dr. Elizabeth W. Howerth, Department of Pathology, Dr. David E. Stallknecht, Department of Medical Microbiology and Parasitology, College of Veterinary Medicine, Dr. Danny Mead, Southeastern Cooperative Wildlife Disease Study (SCWDS), University of Georgia
	Eric Wright	Isolation and Characterization of Novel Anaerobic Thermophilic Iron (III) - Reducing Bacteria
	Faculty Mentor	Dr. Juergen Wiegel, Department of Microbiology, University of Georgia
Room 139	**Vanessa Reynolds**	Cozaar Fails to Block Pressor Response in Cats
	Faculty Mentor	Dr. Scott Brown, Department of Physiology and Pharmacology, University of Georgia
	Amy Sexauer	Immunohistochemical Detection of Newcastle Disease Virus in Chickens Inoculated with Wild-Type and Infectious-Clone-Derived Newcastle Disease Virus
	Faculty Mentors	Dr. James Stanton and Dr. Corrie Brown, Department of Pathology, College of Veterinary Medicine, University of Georgia
	Julie Seale	Nitric Oxide Synthase mRNA Levels in *Trypanosoma cruzi* Infected iNOS Knockout and Wild Type Mice
	Faculty Mentor	Dr. Rick Tarleton, Department of Cellular Biology and Center for Tropical and Emerging Global Diseases, University of Georgia

Room 140	**Rodricus Ficklin**	The Multicultural Experience: Pre-Service Education Students in Early Childhood Education Related to Multicultural Beliefs and Attitudes
	Faculty Mentor	Dr. Judith Reiff, Department of Elementary Education, University of Georgia
	Cori Pelletier	Music Therapy with Premature Infants
	Faculty Mentor	Dr. Roy Grant, Music Therapy, School of Music, University of Georgia (Emeritus)
	Ryan Keen	Gender Differences in Internal and External Thought Focus among Prepubescent Children
	Faculty Mentor	Dr. Katherine Kipp, Department of Psychology, University of Georgia
Room 141	**Denny Aldridge**	Are We or Aren't We? Adorno and Aciman on Emigrant Identity
	Faculty Mentor	Dr. Katharina Wilson, Department of Comparative Literature, University of Georgia
	Drew Goldsmith	Received with Open Arms; A Study of the Parable of the Prodigal Son
	Faculty Mentor	Dr. Katharina Wilson, Department of Comparative Literature, University of Georgia
	Karen Viars	Joan of Arc: History's Conflicted Warrior
	Faculty Mentor	Dr. Katharina Wilson, Department of Comparative Literature, University of Georgia
Room 142	**Qualitative Research as a Method of Inquiry: A Panel –** Anne Ciccone, Ivo Ivanov, Matt Lerner, Julie Orlemanski, and Nadine Sumner	
	Faculty Mentor	Dr. Kathleen DeMarrais, Social Science Education, University of Georiga

Opening Session

Tate Student Center, Georgia Room A

4:00 p.m.	Welcome	Dr. Pamela B. Kleiber Associate Director, Honors Program and CURO
	Opening Remarks	Dr. Karen Holbrook, Senior Vice President for Academic Affairs and Provost
	Opening Presentation	Melissa Daniel Profiles of UGA Researchers
	Faculty Mentor	Dr. Carolina Acosta-Alzuru, Department of Public Relations, University of Georgia
Introduction of Dr. Steven Stice		Allison Mitchell, Humanities and Arts Editor of JURO@GA, English Major, and Biology Minor
	Keynote Address	Dr. Steven Stice Georgia Research Alliance Eminent Scholar Department of Animal and Dairy Science

A View from the Laboratory:
Scientific Possibilities and Ethical Restraint in Human Stem Cell Research

Announcement of the CURO 2002 Summer Research Fellowship Recipients	Dr. Harry Dailey, Department of Microbiology

5:00-7:00 p.m. Reception sponsored by the Honors Program (Georgia Room B) and Poster Presentations

Poster Presentations

Robert F. Adams Faculty Mentor	Daily Progeny Production and Sex Ratio in a Parasitoid Wasp Dr. Robert W. Matthews, Department of Entomology, University of Georgia
Laurie L. Barton Faculty Mentor	The Association of Service to Tolerance of Diversity: A Study of College Student Involvement in Community Service Dr. Lynda Henley Walters, Department of Child and Family Development, University of Georgia

Amanda Beggs, Matthew Jackson, Venus Jolly, Judith Niehuser, Ashley Pollock, Drew Prosser, Emily Toriani	Mate Preference and Offspring Fitness in *Drosophila pseudoobscura*
Faculty Mentors	Dr. Wyatt W. Anderson and Dr. Yong-Kyu Kim, Department of Genetics, and Dr. Patricia A. Gowaty, A & S Institue of Ecology, University of Georgia
Anna Biagi	Metamorphic History of the Shoulderbone Ultramafic Intrusion
Faculty Mentor	Dr. Michael Roden, Department of Geology, University of Georgia
Amanda M. Blackmon	Pain Factors Associated with a Strength and Power Training Program in Older Adults
Faculty Mentor	Dr. M. Elaine Cress, Department of Sports and Exercise Science and the Gerontology Center, University of Georgia
Amanda Casto	Analysis of the Role of the Protein Hfq in the Regulation of Polyadenylation in *Escherichia coli*
Faculty Mentor	Dr. Sidney Kushner, Department of Genetics, University of Georgia
Quyen Dam	Clones of Resistant *Enterococcus faecium* Found in Humans and in Their Pets
Faculty Mentor	Dr. Susan Sanchez, Athens Diagnostic Laboratory, College of Veterinary Medicine, University of Georgia
Glorianne de Guzman and Joseph Moore	Application of Bioinformatics for Analysis of Sorghum ESTs
Faculty Mentors	Dr. Marie-Michèle Pratt and Dr. Lee Pratt, Department of Botany
Lawrence Dougherty	Exploring Olfactory Response in *Drosophila melanogaster* and Evolutionary Theory of Aging
Faculty Mentor	Dr. Daniel Promislow, Department of Genetics, University of Georgia
Joseph Kirk Edwards	Refining the Pig Cloning Process: The Effect of Ovarian Follicle Diameter and the Amount of Cumulus Cells on *In Vitro* Maturation of Porcine Oocytes
Faculty Mentor	Dr. Steven Stice, Department of Animal and Dairy Science, University of Georgia
Daniel Folkers, Jai Sikes Sam Utley	Characterization of Nonlinear Viscoelastic Properties of Biomaterials, through High-Speed Linear Based Transformation
Faculty Mentor	Dr. Guigen Zhang, Department of Biological and Agricultural Engineering, University of Georgia

Holly H. Garner	Effect of Fill Weight and Initial Temperature on Processing Time for a Home Pickled Jicama Relish
Faculty Mentor	Dr. Elizabeth L. Andress, Department of Foods and Nutrition, University of Georgia
Brian Gerwe	Structural Genomics Using a Model Microorganism
Faculty Mentor	Dr. Michael W.W. Adams, Department of Biochemistry and Molecular Biology, University of Georgia
Leah Givens	Relative Pathogenicity of Two Strains of Canine Distemper Virus Originally Isolated from Lions
Faculty Mentors	Dr. James Stanton and Dr. Corrie Brown, Department of Pathology, College of Veterinary Medicine, University of Georgia
Scott Harelik	Identification of the NDV-Fusion Protein and NDV-Phosphoprotein in Transgenic Soybean Plants
Faculty Mentor	Dr. Wayne Parrott, Department of Crop and Soil Sciences, University of Georgia
Jessie Hopkins	Comparison of Several DNA Extraction Methods in Conjunction with PCR for the Rapid Detection of *Rhodococcus equi* and *Steptococcis equi*
Faculty Mentor	Dr. Susan Sanchez, Athens Diagnostic Laboratory, College of Veterinary Medicine, University of Georgia
Lindsay Hoskins	The Formation of Hirano Bodies in Mammalian Cell Culture
Faculty Mentors	Dr. Ruth Furukawa and Dr. Marcus Fechheimer, Department of Cellular Biology, University of Georgia
Jacoby Hudson Cassandra Kirkland and Crystal Oliver	Identifying Expressed Genes in Sorghum
Faculty Mentors	Dr. Marie-Michèle Pratt and Dr. Lee Pratt, Department of Botany, University of Georgia
Ryan Keen	Gender Differences in Internal and External Thought Focus among Prepubescent Children
Faculty Mentor	Dr. Katherine Kipp, Department of Psychology, University of Georgia
Dipinder Singh Keer	An Online Analytical Processing Approach to Single Nucleotide Polymorphism Discovery and Analysis
Faculty Mentors	Dr. Marie-Michèle Pratt, Dr. Chun Liang, and Dr. Lee Pratt, Department of Botany, and Dr. Mark Huber, Department of Management Information Systems, University of Georgia
Emily Kirk	The Stevens Clinic - A Sports Medicine Facility
Faculty Mentor	Dr. Jane Lily, Interior Design, University of Georgia

Heather Kling	Utilization of Cover-Boards by Eastern Tiger Salamander (*Ambystoma tigrinum tigrinum*) Metamorphs at Brookhaven National Laboratory
Faculty Mentor	Dr. Timothy Green, Brookhaven National Laboratory, Upton, NY, and Dr. Karl Espelie, Department of Entomology, University of Georiga
Dmitri Kolychev	Analysis of Microsatellites in Sorghum ESTs
Faculty Mentor	Dr. Marie-Michèle Pratt, Dr. Lee Pratt, and Dr. Suchendra M. Bhandarkar, Department of Botany, University of Georgia
Meenakshi Lambha	Development of Cognitive Inhibition in Preschool Children
Faculty Mentor	Dr. Katherine Kipp, Department of Psychology, University of Georgia
Shelley Ledford	The Colorfastness of an Interlock T-shirt Material Laundered with a Detergent Compared to Laundering with a Detergent Plus Enzyme
Faculty Mentor	Dr. Nolan Etters, Department of Textiles, Merchandising, and Interiors, University of Georgia
Rachel Lewis	Neuropeptide Y as a Factor in Ethanol Consumption in Zucher Rats
Faculty Mentor	Dr. Gaylen Edwards, Department of Physiology and Pharmacology, College of Veterinary Medicine, University of Georgia
Cliff McLeroy	An Analytical Study of Interfacial Stresses in Bonded Materials
Faculty Mentor	Dr. Guigen Zhang, Department of Agricultural and Biological Engineering, University of Georgia
Eric Morishige	Transgenic Study of a Conserved Neuropeptide Network for Feeding Regulation in *Drosophila*
Faculty Mentor	Dr. Ping Shen, Department of Cellular Biology, University of Georgia
Sara Morris	Fish Oil: The Effect on Insulin Sensitivity When Incorporated into a High-fat Diet
Faculty Mentor	Dr. Dorothy B. Hausman, Department of Foods and Nutrition, University of Georgia
Cori Pelletier	Music Therapy with Premature Infants
Faculty Mentor	Dr. Roy Grant, Music Therapy, School of Music, University of Georgia (Emeritus)
Linda Pierce **Christine Oshansky**	Chimpanzees' Manipulation of Objects within the Hand
Faculty Mentor	Dr. Dorothy M. Fragaszy, Department of Psychology, University of Georgia

Jennifer Reingold	The Relationship between Critical Flicker Fusion Thresholds and Resting Systolic Blood Pressure
Faculty Mentor	Dr. Billy R. Hammond, Department of Psychology, University of Georgia
Tricia Rodriguez	Amphibian Declines and the Frog Fungus Disease: Effects of Infection of Frog Eggs and Tadpoles
Faculty Mentor	Dr. David Porter, Department of Botany, University of Georgia
Shomari Ruffin	Polar Endemism in Archaea: A Comparison of Archael 16S rDNA Sequences from the Arctic and Southern Oceans
Faculty Mentors	Dr. James T. Hollibaugh and Dr. Nasreen Bano, Department of Marine Sciences, University of Georgia
Alexandra Isabel Sahora	Cellular Tropism of an Undescribed Ehrlichia from White-Tailed Deer
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Katrice Saudargas	Children's Friendship Groups: The Wannabes in the Clique Hierarchy
Faculty Mentor	Dr. Michele Lease, Department of Educational Psychology, Research and Measurement, University of Georgia
Amy Sexauer	Immunohistochemical Detection of Newcastle Disease Virus in Chickens Innoculated with Wild-Type and Infectious-Clone-Derived Newcastle Disease Virus
Faculty Mentor	Dr. Corrie Brown, Department of Pathology, University of Georgia
Sonbol Alexandria Shahid-Salles	Purification of Hirano Bodies in *Dictyostelium discoideum*
Faculty Mentors	Dr. Marcus Fechheimer and Dr. Ruth Furukawa, Department of Cellular Biology, University of Georgia
Jai Sikes	Developing a Sensor for Measuring Suspended-Sediment Concentration
Faculty Mentor	Dr. Bruce L. Upchurch, Department of Biological and Agricultural Engineering, University of Georgia
Lauren Stanchek	The Effect of Light Intensity on the Transformation Frequency of Soybean Somatic Embryos
Faculty Mentor	Dr. Wayne Parrott, Department of Crop and Soil Sciences, University of Georgia

Tracy K. Van Ells	The Use of Innunohistochemistry to Diagnose Chytridiomycosis in Frogs
Faculty Mentor	Dr. Corrie Brown, Department of Pathology, University of Georgia
Heidi Woessner	Cytoskeleton Induced Apoptosis of HeLa Cells
Faculty Mentors	Dr. Ruth Furukawa and Dr. Marcus Fechheimer, Department of Cellular Biology, University of Georgia
Amber Wright	The Effect of Genetic Background on Stress Resistance in Transgenic Fruit Flies
Faculty Mentor	Dr. Daniel Promislow, Department of Genetics, University of Georgia
Eric Wright	Isolation and Characterization of Novel Anaerobic Thermophilic Iron(III)-Reducing Bacteria
Faculty Mentor	Dr. Juergen Wiegel, Department of Microbiology, University of Georgia

Tuesday, April 16, 2002
Memorial Ballroom

Opening of CURO Art Exhibition

9:00 a.m.	Welcome	Dr. Betty Jean Craige, Director, Center for Humanities and Arts, and University Professor of Comparative Literature
	Breakfast Reception	
9:15 - 10:15 a.m.	Gallery Talks Introduction	Dr. Carmon Colangelo, Director, Lamar Dodd School of Art

Stephanie Anderson
Faculty Mentor — Professor Edward Lambert, Fabric Design, Lamar Dodd School of Art, University of Georgia

Antibiotic Art
Jeff Edwards
Faculty Mentor — Professor Robert Stackhouse, Lamar Dodd Professorial Chair, Lamar Dodd School of Art, University of Georgia

Caitlin Martell
Faculty Mentor — Professor Melissa Harshman, Printmaking, Lamar Dodd School of Art, University of Georgia

Amanda Gary
Faculty Mentor — Professor Edward Lambert, Fabric Design, Lamar Dodd School of Art, University of Georgia

"each morning I get up with one word in mind: plastik…"
Lorina Naci
Faculty Mentor — Professor William Paul, Jr., Drawing and Painting, Lamar Dodd School of Art, University of Georiga

Theresa Marie Sporer
Faculty Mentor — Professor Larry Millard, Sculpture, Lamar Dodd School of Art, University of Georgia

Art Exhibit arranged by Professor Edward Lambert

Performing Arts Presentations
Memorial Ballroom

10:15 – 10:30 a.m.	**Jennifer Srygley** Faculty Mentor	Poetry Reading Professor Judson Mitcham, Department of English, University of Georgia

10:45 – 11:45 a.m.	**Lynn Nguyen** Faculty Mentor	Chinese Classical Dance Dr. Mark Wheeler, Department of Dance, University of Georgia
	Elizabeth Lide Faculty Mentor	Improvisation in the Choreographic Process Dr. Bala Sarasvati, Department of Dance, University of Georgia

12:00 – 2:30 p.m. **Instrumental and Vocal Music Performances**

Performances arranged by Lisa Bartholow, School of Music

Closing Session

Memorial Ballroom

3:30 p.m. Reception sponsored by the Honors Program

4:00 – 6:00 p.m.	Awards Ceremony	Professor Jere W. Morehead, Associate Provost and Director, Honors Program Dr. Karen Holbrook Senior Vice President for Academic Affairs and Provost

Presentation of the Excellence in Undergraduate Research Mentoring Awards

Presentation of the Georgia Museum of Natural History Joshua Laerem Award for Undergraduate Research

Presentation of the Best Paper Awards in Science and Social Science

8:00 p.m. Evening Concert Hodgson Hall

The Excellence In Undergraduate Research Mentoring Award

The Office of the Senior Vice President for Academic Affairs and Provost and the Honors Program established the Excellence in Undergraduate Research Mentoring Award in 2000. This award recognizes faculty, departments, and programs devoted to outstanding research mentorship of undergraduate students. Awards are presented at the CURO Symposium Awards ceremony, Tuesday, April 16, 4:00 p.m. Memorial Hall Ballroom.

2002

Faculty Awards
Professor William D. Paul, Jr. Professor of Art
Dr. Katherine Kipp, Associate Professor of Psychology

Faculty Recognition
Dr. Susan Sanchez, Assistant Professor of Veterinary Medicine

Department Award
Department of Biochemistry and Molecular Biology,
Dr. J. David Puett, Department Head

Program Award
"Physics Beyond the Boundaries": National Science Foundation, REU Program
Dr. Loris Magnani, Principal Investigator, Professor, Physics and Astronomy

Dr. Heinz-Bernd Schuttler, Professor and Department Head, Physics and Astronomy
Dr. Jonathan Arnold, Professor, Genetics
Dr. Susmita Datta, Professor, Georgia State University
Dr. David Logan, Professor, Clark Atlanta University
Dr. William Steffans, Professor, Clark Atlanta University

2001 Selection Committee

Chair, Dr. Pamela B. Kleiber, Associate Director, Honors Program and CURO Coordinator
Dr. Marcus Fechheimer, Professor, Cell Biology
Dr. Sylvia Hutchinson, Professor, Institute of Higher Education
Dr. Katarzyna Jerzak, Assistant Professor, Comparative Literature
Dr. David MacIntosh, Associate Professor, Environmental Health Sciences
Dr. Vaun MacArthur, Research Scientist, Savannah River Ecology Laboratory
Dr. Dean Rojek, Associate Professor, Sociology

2001

Faculty Awards
Dr. Marcus Fechheimer, Professor of Cell Biology

Faculty Recognition
Dr. David MacIntosh, Associate Professor of Environmental Health Sciences
Dr. Dean Rojek, Associate Professor of Sociology

Department Award
Genetics Department,
Dr. John MacDonald, Department Head and Professor

Program Award
Savannah River Ecology Laboratory, Dr. Paul Bertsch, Director

Graduate Student Reviewers for CURO Symposium 2002

Julie Barfield	Department of English
Michael Bitzer	Department of Political Science
Michelle Verges	Department of Psychology
Peter Horanyi	Department of Biochemistry and Molecular Biology
Rebecca Ritter	Department of English
Rebecca Shubert	Biochemistry and Molecular Biology
Julie Dangremond Stanton	Department of Cellular Biology
Susan White	Department of Marine Sciences
Julie Wieczkowski	Department of Anthropology

Reviewers for Best Paper Awards

Dr. Meg Cramer	CURO Advisory Board, Physicien
Dr. Stuart Feldman	CURO Advisory Board, Professor of Pharmacy
Peter Horanyi	Department of Biochemistry and Molecular Biology
Dr. Pamela Kleiber	Associate Director, Honors Program and CURO
Susan White	Department of Marine Sciences
Julie Wieczkowski	Department of Anthropology

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Dr. Joseph Dominick, Jr.	Professor, Department of Journalism
Dr. William Eiland	Director, Georgia Museum of Art, Professor, Art History
Dr. Marcus Fechheimer	Professor, Department of Cellular Biology
Dr. Pamela Kleiber	Associate Director, Honors Program and CURO
Dr. Elizabeth Kraft	Professor, Department of English
Dr. Marc L. Lipson	Director, International Business
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Dr. Dean Rojek	Associate Professor, Department of Sociology
Dr. Paul Schroeder	Associate Professor, Department of Geology
Dr. Scott Shamp	Professor, Department of Telecommunications and Director, New Media Institute
Dr. Michael Terns	Associate Professor, Department of Biochemistry and Molecular Biology
Dr. Kecia Thomas	Associate Professor, Department of Psychology
Dr. Katharina Wilson	Professor, Department of Comparative Literature

Research Abstracts

Humanities
Physical and Biological Sciences
Social Sciences

Daily Progeny Production and Sex Ratio in a Parasitoid Wasp

Robert F. Adams
Dr. Robert W. Matthews, Department of Entomology, University of Georgia

The parasitic wasp *Melittobia digitata* (Hymenoptera: Eulophidae) parasitizes various insects. Progeny develop gregariously in groups of 100-800 (depending on host size). The extremely female biased sex ratio (95:5) is unusual among insects, and males develop from unfertilized eggs. The entire brood emerges over a period of two weeks, but males appear to develop on an accelerated schedule relative to females. The goals of this study were to determine (1) whether females lay unfertilized (male producing) eggs first or space male production over their entire tenure on a host, and (2) to determine the average daily progeny production and sex ratio. Fifty-six cultures were established using single females placed on mud dauber hosts. These cultures were divided into 14 groups of four replicates each. Beginning three days later, females were removed from four cultures; this was continued daily thereafter over the next 13 days until all females (four per day) had been removed from their hosts. In a parallel set of experiments, individual females were transferred to a new host each day over 17 days. All experiments were conducted at 25^{o} C. Progeny produced in both experiments were allowed to complete development, and the emerged adults were sexed and counted. Results showed that females space male production over their tenure on a host, averaging 4.2/day (range 1-8) and that daily egg production increased to about 63 over the first seven days, then tapered off as the host became fully exploited. Results are interpreted in the context of the wasp's natural history.

Are We or Aren't We? Adorno and Aciman on Emigrant Identity

Denny Aldridge
Dr. Katharina Wilson, Department of Comparative Literature, University of Georgia

Theodor Adorno fills his *Minima Moralia* with his stance on topics ranging from Snow White to Proust to the demise of communication. Of particular interest to Adorno is the plight of the intellectual in emigration. In his scathingly truthful tone, Adorno asserts that "every intellectual in emigration is, without exception, mutilated, and does well to acknowledge it himself." Adorno's philosophy struck me particularly while reading Andre Aciman's *Out of Egypt*, in which Aciman details his Jewish family's identity struggle as exiles living in Alexandria, Egypt. I therefore undertook the task of methodically applying Adorno's abstract ideas on emigrant identity to Aciman's autobiographical account. The more I read into the texts, the more strikingly parallel they became. More important than my literary analysis, however, is the insight that both authors offer into the psychological and social processes that all emigrants go through in order to assert their rightful place in their new "homeland." Adorno states that "for a man who no longer has a homeland, writing becomes a place to live." In writing *Out of Egypt*, Aciman escapes the shackles of emigrant alienation prescribed by Adorno. He breaks the cycle in his family and becomes an American citizen. In my comparative analysis, I shed light on the oftentimes overlooked status of emigrants, many of which, like Aciman, find refuge within America's borders.

Bumblebee and Wildflower Species Associations
Sharon Ballew
Dr. John Pickering, A & S Institute of Ecology, University of Georgia

The Internet is a means to improve teaching and research. It provides a powerful tool to enable citizen scientists and children to study nature and report their observations. In February 2002, for example, over 40,000 participants in the Great Backyard Bird Count reported observations of birds throughout North America via the Web www.birdsource.org. Research is needed to assess the quality of data reported by non-experts. Nature Days is a program in which students and other citizens establish ecological study sites and collect data to better understand and conserve nature. Participants will be assigned to a group with a designated leader who has natural history expertise. In 2002, these leaders will serve as mentors and monitors of groups studying pollination associations among bumblebees, butterflies, and flowers. The presentation will demonstrate how Web users can identify species and report their observations via their browser using online identification guides. These guides are primarily image-based and minimize technical terms. They have the potential to allow anyone anywhere to contribute to our understanding of all living things. More information can be found under Idnature Guides at www.discoverlife.org.

The Association of Service to Tolerance of Diversity: A Study of College Student Involvement in Community Service
Laurie L. Barton
Dr. Lynda Henley Walters, Department of Child and Family Development, University of Georgia

Community service has become an increasingly important factor in institutions of higher education for the personal development of college and university students. This research concerns the association of participation in community service with the personal development of university students. I am also interested in how exposure to diverse populations through community service affects tolerance of diversity. Data (psychosocial maturity such as identity development and commitment to community attitudes; attitudes toward community service, and involvement in community service) will be collected from students in large classes at the University of Georgia through the use of a questionnaire. The questionnaire will include inquiries based on the three scales: the community service attitude scale, the tolerance scale, and the developmental measure of personal maturity. The questionnaire will be distributed to approximately 300 students. Results will yield information about motivation for community service, the intrinsic and extrinsic benefits of participation in community service, and the tolerance of diversity that results from one's participation. With these results, it will be possible to begin to discriminate between the effects of developmental maturity, prior attitudes, and experience. The results will be helpful to researchers and practitioners whose interest is the personal development of college students.

Progress toward the Partial Purification of a Pectin Biosynthetic Gene
Siobahn Beaton, CURO Summer Research Fellow
Dr. Debra Mohnen, Complex Carbohydrate Research Center, University of Georgia

Cellulose, hemicellulose, and pectin are the major types of polysaccharides that comprise the primary plant cell wall. Homogalacturonan (HGA) is one of the pectic polysaccharides. HGA accounts for 60% of pectin. HGA is a linear polymer of 1,4-linked α-D-galactosyluronic acid residues (GalA). The transfer of GalA from UDP-GalA onto HGA is catalyzed by a galacturonosyltransferase (GalAT) that has its catalytic site facing the lumen of the Golgi. The goal of my research was to facilitate the purification of GalAT from *Arabidopsis thaliana*. Specifically, I fractionated partially purified *Arabidopsis* cell extract over ten different dye affinity resins and characterized those fractions enriched for GalAT activity. I used column chromatography followed by sodium dodecyl sulfate-polyacrylamide gel electrophoresis (SDS-PAGE) of the column fractions to analyze the complexity of proteins present in the different fractions. Based on the SDS-PAGE and GalAT activity results, one of the dye affinity resins, RY3, was shown to effectively enrich for GalAT activity. This resin is currently being used for the further purification of GalAT.

Mate Preference and Offspring Fitness in *Drosophila pseudoobscura*

Amanda Beggs, Matthew Jackson, Venus Jolly, Judith Niehuser, Ashley Pollock, Drew Prosser, and Emily Toriani
Dr. Patricia A. Gowaty, A & S Institute of Ecology, Dr. Wyatt W. Anderson, Dr. Yong-Kyu Kim, and Kyungsun Kim, Department of Genetics, University of Georgia

Natural selection is expected to adjust behavior to increase fitness. We tested this hypothesis with *Drosophila pseudoobscura* while observing the relationships between mate preference and fitness. Mate preference was determined in small arenas where a single fly was allowed to choose between two flies of the opposite sex eliminating all possibilities for male-male competition, female-female competition and male coercion or manipulation of females which were involved in ordinary mate choice studies. Matings were arranged with preferred (P) and non-preferred (NP) partners. We measured fecundity of females (number of eggs laid daily) and egg-to-adult viability of offspring. Our early studies have demonstrated that fecundity was higher in NP matings but not statistically significantly different from in P matings. However, offspring viability was significantly higher in P matings. Subsequently, we measured fitness of males while counting number of sperm delivered to females during copulation. In both male and female choice situations, NP matings delivered significantly more sperm to females than P matings. These results suggest that 1) freely expressed mate choice affects the fitness of offspring; and 2) the increase in fecundity and sperm observed in NP matings may be compensatory behavior for a low viability of offspring from these matings. As attempts to pinpoint the proximate cues for choosing partners in mate preference trials, we measured wing length of flies, which was proportional to their body size. We also measured quantities of cuticular hydrocarbons extracted from individual flies using gas chromatography/mass spectrometry (GC/MS). Preferred partners, regardless of sexes, were significantly bigger than NP partners. There was a nonsignificant tendency that NP partners produced more cuticular hydrocarbons than P partners did. Overall, our data provide evidence that social constraints are important in mate preference and offspring fitness.

Metamorphic History of the Shoulderbone Ultramafic Intrusion

Anna Biagi
Dr. Michael Roden, Department of Geology, University of Georgia

Georgia's Piedmont is underlain primarily by igneous and metamorphic rocks. These rocks formed throughout the Paleozoic during events coinciding with the Appalachian orogeny. Isolated bodies of ultramafic rocks may represent fragments of oceanic crust emplaced in the continental crust during the orogeny. The Shoulderbone schist, located northwest of Sparta, Georgia, is one such ultramafic body, and I hypothesize that it is a fragment of ocean crust. Seven samples have been taken from where the schist runs along Georgia Highway 16 and Centennial Road in Hancock County. Their mineralogy has and will be noted using a binocular-scope, a light microscope, and an electron microprobe. Preliminary research has found the mineralogy to include chlorite, olivene, amphiboles, and oxides. Further work with the microprobe will help determine which amphiboles and oxides are present, as well as the composition of the olivene. The major elements in the schists are SiO_2, MgO, and Fe_2O_3 (determined by the microprobe). The bulk chemical composition of these ultramafics will then be compared to those found in the ocean crust. The relationship of the minerals to each other and the presence of foliations also will be noted and compared between samples. Research of the Shoulderbone ultramafics will elucidate the metamorphic and tectonic history of the outcrop. Although this research only focuses on one small outcrop, it will be a step towards understanding the evolution of the Appalachians, which has been a mystery for nearly a century.

Pain Factors Associated with a Strength and Power Training Program in Older Adults

Amanda M. Blackmon
Tanya A. Miszko, Dr. M. Elaine Cress, Department of Sports and Exercise Science and the Gerontology Center, University of Georgia

Pain is often cited as a barrier to participation in an exercise program among older adult populations. Yet, once in an exercise program, research shows that exercise can have an analgesic effect, especially in those older adults with osteoarthritis. We know that exercise is necessary to maintain health and function, and inactivity can lead to declines in the neurological, musculoskeletal, and metabolic systems. Despite the known benefits of exercise, more than 60% of older adults are physically inactive. Therefore we asked the question: Does pain affect compliance and adherence to a strength and power training program with sessions 3 times/week for 16 weeks? The study included 25 older adults, with ages ranging from 65 to 82, with a mean age of 73.36. The participants reported the intensity, unpleasantness, and anatomical site of any pain. We are comparing the change in strength and physical function in those with chronic pain (CP; n=8) with the remainder of the group, that we considered the non-pain group (NP; n = 17). CP did not alter compliance or adherence. We found that the CP group realized a 28% increase in strength compared to a 20% increase in the NP group. Functional performance in the CP group increased 11-14%, which was similar or higher than the NP group. NP and CP did not differ in adherence or compliance. The CP group's gain in strength and function may represent an analgesic effect of exercise allowing those in chronic pain to improve function.

Lack of Utility of Creatinine Concentration for the Diagnosis of Feline Chronic Renal Insufficiency

Lindsay Boozer
Leslie Cartier, Susanne Sheldon, Sheerin Mathur, and Dr. Scott Brown, Department of Physiology and Pharmacology, University of Georgia

Clinically, mild to moderate chronic renal insufficiency is a frequent problem in cats. While serum creatinine is most often used to assess renal function in cats, each laboratory traditionally establishes its own normal ranges and the utility of these normal ranges to diagnose early chronic renal insufficiency has been challenged. To assess the utility of measurement of serum creatinine concentration in the diagnosis of renal insufficiency in cats, serum samples were taken from 15 cats with various levels of kidney function and submitted to laboratories located at academic institutions (n=8) or commercial facilities (n=4). The laboratories used various blood chemistry analyzers to assay for serum creatinine levels. While the study was not control-based, the subjects measured were both affected and unaffected by renal infarction or dysfunction. There was substantial variation among laboratories for serum samples obtained simultaneously from the same cat. Results were analyzed statistically for coefficient of variation and standard deviation calculations in order to adjust the values for comparison. When reported results were compared to established "normal" ranges at each laboratory, diagnostic errors were noted, such as false negative and false positive diagnoses. Using these laboratory "normal" ranges, some cats with normal kidney function were incorrectly diagnosed as having renal insufficiency while other cats with proven renal insufficiency were diagnosed as normal. Our results indicate that a reference range individualized to each laboratory is needed and that results from different laboratories cannot be directly compared. Critically, veterinarians relying upon currently published laboratory "normal" ranges for serum creatinine concentration for identifying the presence of chronic renal insufficiency in cats will experience a high probability of both false negative AND false positive results.

Reaching Across Cultures: An International Teaching Experience

Carrie Brooks
Dr. Carole Henry, Art Education, University of Georgia

The purpose of this research project was to investigate the potential success and possible benefits of art education students having practical classroom experience teaching art to non-English speaking students in another culture. During Spring Break 2001, I was one of three art education students who traveled to Cortona, Italy as part of a pilot program designed to explore the possibilities of teaching art in the Italian elementary school. We prepared lesson plans and taught in the Italian language to the students. Our project's goal was to make it possible in the future for Art Education classes to be offered as part of the UGA Studies Abroad Program in Cortona. Each of us had previously studied in Cortona as art students. I used my familiarity with the Italian language to help translate throughout the project and learned much about teaching in the process. We gathered data after each lesson through audio taped interview sessions and had these tapes transcribed. I analyzed the data to determine what I learned about working with non-English speaking students in another culture, what suggestions I had for other students attempting to do this in the future, and what I learned about myself as a teacher. I learned that it is possible to communicate depth of content despite language barriers. What was so unique about this project was that the nature of children and of visual art transcended verbal language. Recommendations based on the data were also developed for teachers teaching non-English speaking students in this country. These recommendations will be presented.

Risk/Resilience Systems and Child Behavioral Development

Robert Brown, CURO Apprentice
Dr. R. W. Kamphaus, Department of Educational Psychology, University of Georgia

This study tested Ann Masten's (2001) theory that most children develop adaptive behavioral repertoires. Masten proposed that three risk/resilience systems are responsible for the typical behavioral adjustment of children: relationships with parents, intelligence, and socioeconomic status. This pilot investigation tested part of her theory with a sample drawn from a larger longitudinal investigation of 800 children. This study assessed a sample of 58 children from grades 3 through 5 in three Athens/Clarke County elementary schools. Three groups were formed: 1) "well adapted" (children rated by two consecutive teachers as having few behavior problems in comparison to a national normative sample), 2) "disruptive behavior problems" (children rated by two consecutive teachers as having significant behavior problems), and 3) "changers" (children rated as having disruptive behavior problems in year one, but as having fewer behavior problems as rated by a new teacher in the following academic year). Dependent variables included parent/teacher relationship and intellectual/academic achievement, thus allowing for a preliminary test of two risk/resilience systems from Masten's theory. Analyses of variance were conducted comparing the three groups on each of six dependent variables. The results supported Masten's theory. Children who either were well adapted or were changers had better indicators of parent/teacher relationships and intellectual/academic development than children who remained in the disruptive behavior problems group. Teacher/child relationships were also found to be important for promoting adaptive behavioral development.

Rapid Detection of *Salmonella* Using Three DNA Extraction Methods in Conjunction with Polymerase Chain Reaction

Kristen Bryant
Dr. Susan Sanchez, Athens Diagnostic Laboratory, College of Veterinary Medicine, University of Georgia

Controlling outbreaks of *Salmonella enterica* in horses when they arise can be extremely challenging; therefore, it is crucial to have a quick, very sensitive method that allows for rapid detection of this bacteria in asymptomatic horses so these animals are not put in contact with others. The primary objective of this study was to determine which DNA extraction method yields more DNA for prompt detection of *Salmonella*. Three DNA extraction methods were employed: the boding method, Ultra Clean ™ Fecal DNA Isolation Kit (Mo Bio Laboratories, Inc., Solana Beach, CA) and QIAamp DNA Stool mini kit (Qiagen Inc., Valencia, CA). The boiling method and the Ultra Clean ™ kit were used on duplicate logarithmic dilutions of a selenite broth containing over night growth of *Salmonella*. These DNA extractions were followed by amplification by polymerase chain reaction of a 475bp fragment of the *InvA* gene present only in *Salmonella*. The dilution method was able to detect only 10^6 bacteria, while Ultra Clean ™ was able to detect $3.6x10^3$ bacteria. In addition to the logarithmic serial dilutions, six selenite broths and three fecal samples from real clinical cases were also tested. These samples were extracted using Ultra Clean ™ and Q1Aamp DNA, always in duplicate Ultra Clean detected 6 positive selenites in comparison two only two by QIAamp. Three fecal samples were tested directly; two were negative by both test and one sample positive for both tests. Although the Ultra Clean ™ kit is the most time consuming, it appears to be the most effective in extracting the most DNA in both the quantitative serial dilutions, as well as in the clinical samples.

An Assessment of Judicial Review and Judicial Behavior: The Factors That Influence the Supreme Court Decision Making Process

Jennifer Byrne
Dr. Stefanie Lindquist, Department of Political Science, University of Georgia

In this study, I propose to develop an integrated case-related model, using a multivariate time series analysis to explain United States Supreme Court decisions in judicial review cases. In order to ascertain why the Supreme Court decides to uphold or strike down a piece of legislation in a given case, I examine eight factors that have been previously identified by scholars as contributing to the Court's decision in these cases. Specifically, I intend to test the impact of five different models that encompass the independent variables that I hypothesize will influence the Supreme Court's decision to strike down a federal statute as unconstitutional. The attitudinal model addresses the impact of justice ideology, measured by the criteria set forth by Segal and Spaeth (1993), including past voting behavior to predict votes in subsequent cases, facts from the lower court records of cases decided by the Supreme Court and editorials published in advance of nominee confirmation of the justices. The institutional model examines the impact that the solicitor general, congress, and interest groups have on the Supreme Court decision-making process. The issues model looks at the type of statute challenged and controls for the lower court decision, while the party capability model examines the impact of the type of litigant in a given case. Finally, the role of public opinion is examined through the use of the Stimson Public Mood Indicator, compared to how liberal the Supreme Court is in a given session. By combining several factors into a comprehensive multivariate model, a greater understanding of the judicial decision-making process can be achieved.

Analysis of the Role of the Protein Hfq in the Regulation of Polyadenylation in *Escherichia coli*
Amanda Casto
Dr. Sidney Kushner, Department of Genetics, University of Georgia

Polyadenylation is a term that refers to the enzymatic addition of adenine residues to the 3' end of mRNA transcripts. In prokaryotes, poly(A) tails are believed to promote the decay of mRNA transcripts by serving as binding sites for ribonucleases that degrade them. The purpose of this research is to investigate the effects of a protein known as Hfq on polyadenylation in *Escherichia coli*. Previous studies have indicated that poly(A) tails found in Hfq^- strains are significantly shorter than those found in wild type strains, presumably because Hfq either protects poly(A) tails from enzymatic degradation or aids in the action of poly(A) polymerase I (PAP I), the enzyme primarily responsible for poly(A) tail synthesis in *E. coli*. This hypothesis was initially tested by sequencing poly(A) tails from an Hfq^- strain. These tails were found to be of normal length, but contained non-A residues and were attached to the mRNA transcripts at positions where tails are not typically observed in wild type strains. The next step in this project will be to clone and sequence poly(A) tails from an *E. coli* strain deficient in both Hfq and polynucleotide phosphorylase (PNPase), an enzyme that is known to synthesize poly(A) tails containing non-A residues. Thus, the tails in this double mutant are expected to be homopolymeric and attached to the transcripts in positions where tails are usually observed in wild type strains.

Qualitative Research as a Method of Inquiry: A Panel
Anne Ciccone, Ivo Ivanov, Matt Lerner, Julie Orlemanski, Nadine Sumner
Dr. Kathleen DeMarrais, Social Science Education, University of Georgia

In the quest to understand the world around us, questions inevitably arise that cannot be addressed by quantitative research alone. Instead, a discipline of inquiry that probes individual and non-quantifiable issues is needed; in a word, certain questions demand qualitative research for their answering. Through our CURO research seminar, we explored the specific strengths, techniques, and limitations of qualitative research in their application to our own pilot projects. This panel will focus on our individual experiences of learning through qualitative research, learning not just about our chosen subjects but also about the research process in general. Each student will speak briefly about his or her experience and findings, and the panel will then accept questions from the audience. We intend to focus on the organic demands for a qualitative approach inherent in our research questions, on the actual process and techniques that we used, and on the final conclusions and evaluations to which our pilot projects lead us. Qualitative research experience on the undergraduate level is rare; thus we feel it is important that we share our insights and experiences of using qualitative research in hopes of stimulating more interest in and employment of this valuable mode of inquiry.

Differences in Cognitive Content between Propositions with Equivalent Referential Truth Conditions
Adam Cureton
Dr. Yuri Balashov, Department of Philosophy, University of Georgia

In everyday language, we often assert that two things are identical. We assert that 'the Morning Star is the Evening Star' or that 'Clark Kent is Superman' and intuitively understand the content of such statements. When we attempt to provide a philosophical underpinning for our intuitions, however, we arrive at a problem: When we assert that two things are identical, what exactly are these 'things.' Frege famously suggested that when we assert an identity, we assert that the names refer to the same objects. 'Morning Star' is the name we use to refer to the planet Venus, and 'Evening Star' is also used to refer to that same planet. Therefore, when we say that 'the Morning Star is the Evening Star' we mean that the terms 'Morning Star' and 'Evening Star' refer to the same object, Venus. If this is the case, however, how are we to differentiate between statements like 'Clark Kent is Clark Kent' and 'Clark Kent is Superman,' since both sets of names refer to the same object? The two statements appear to communicate different ideas, whereby the former is an uninteresting tautology, while the latter provides interesting information. I suggest that the difference in cognitive content between these classes of statements consists of differences in meta-linguistic facts and differences in ability to perform cognitive housekeeping functions. When I learn that 'Clark Kent is Superman,' I learn facts about how the terms 'Clark Kent' and 'Superman' are used in our language that I do not learn when I am told that 'Clark Kent is Clark Kent.' Also, when I learn that 'Clark Kent is Superman,' I am able to adjust some of my other beliefs given the new information that I would not be able to perform if I only learned that 'Clark Kent is Clark Kent.'

Privacy as Autonomous Control of Personal Information
Adam Cureton
Dr. Clark Wolf, Department of Philosophy, University of Georgia

Most of us have little trouble identifying cases in which we take our privacy to have been violated. Privacy violations seem to be clear-cut, and we consider other people as morally wrong if they participate in such actions. Once we examine our intuitions more closely, we find that our concept of privacy seems to be intimately connected with individual autonomy. I take up such an analysis in this project. I attempt to provide necessary and sufficient conditions for privacy infringements so that we are clearly able to identify such cases. Understood in the way I suggest, privacy interests amount to the range of autonomous actions an individual takes which concern the protection of self-regarding information. A violation of a person's privacy therefore amounts to a failure to respect that person's autonomy. Since most attribute a great deal of moral value to autonomy, analyzing privacy in terms of autonomy helps ground the moral value that most attribute to privacy, and thereby helps to justify the status of privacy as a moral right rather than merely an interest.

Development of an *In Vitro* Packaging System for a *Streptomyces* Bacteriophage

David Cureton, CURO Summer Research Fellow
Dr. Janet Westpheling, Department of Genetics, University of Georgia

Streptomyces are gram-positive, soil bacteria that produce most of the natural product antibiotics used in human and animal health care. *Streptomyces* have an unusual cycle of cellular differentiation and synthesize these antibiotics as part of their normal development. The stereochemistry of the compounds produced by *Streptomyces* is extremely complex, making them impossible to produce synthetically. Consequently, the genetic manipulation of commercially valuable species of *Streptomyces* may provide a means of generating novel antibiotics. The ability to transfer DNA from one *Streptomyces* species to another is crucial for generating recipient cells with recombinant genotypes. Recently, generalized transduction, a common method of transferring DNA between cells using bacterial viruses, or phage, was adapted for use in *Streptomyces* in the Westpheling lab. An extension of this technique is to use components of the phage to package DNA *in vitro* for the transduction of specific DNA sequences. The procedures for generating phage particles *in vitro* were adapted from similar systems developed for phages λ, P22, and ϕ29. The protocol includes the establishment of a growth curve to determine the time at which immature (empty) phage heads can be isolated and the conditions under which the nascent particles will mature after the incorporation of exogenous DNA. An important application of this technology will be the use of *in vitro* packaging to transduce antibiotic biosynthesis genes between species of *Streptomyces* to facilitate recombinatorial biosynthesis of novel antibiotics.

Clones of Resistant *Enterococcus faecium* Found in Humans and in Their Pets

Quyen Dam
Dr. Susan Sanchez, Athens Diagnostic Laboratory, College of Veterinary Medicine, University of Georgia

By phenotypically and genotypically characterizing enterococci isolated from the feces of humans and their pets, this project examined whether enterococci can be transferred between hosts. *E. faecalis*, *E. faecium*, *E. avium*, and *E. hirae* were the species identified in a total of 199 isolates from eight households both from owners and their pets. Genotypic characterization by three PCR methods allowed identification of two households where the same *E. faecium* clones were carried in the feces of a human and their pet. *Enterococcus* resides in the intestinal tract of humans and animals without normally causing disease. Recently, infections caused by *Enterococcus* spp., particularly in hospitals, have become a major problem due to the trend in increasing antibiotic resistance. As a result, the manner and facility with which enterococci acquire resistance is of great importance. Transmission of resistant bacteria can take place through various routes and has raised concerns as to the possibility transmission through animals. Much study has been undertaken to investigate feed animals as a source of resistant bacteria; however, there has been little study on household pets as another source. In human medicine, administration of antibiotics is heavily scrutinized. In veterinary medicine, which employs many of the same antibiotics, administration is not as closely monitored. While the clones that we found common between humans and their pets might only be indicative of transient colonization, horizontal gene transfer could take place with other bacterial species within the intestinal tract resulting in a higher degree of antibiotic resistance in the normal flora *Enterococcus* spp. of humans.

Identifying the Risks of China's Nuclear Weapons Command-and-Control System in the Event of Political Crisis

Jon E. Davis, CURO Summer Research Fellow
Dr. Gary Bertsch, Department of Political Science, University of Georgia

The purpose of this study is to assess, as far as possible, the exact nature of China's nuclear command-and-control system in the hopes of identifying possible areas of risk of unauthorized or accidental launch in times of crisis. A qualitative case study will examine past weaknesses in China's nuclear weapons command-and-control structure; the current state of civil-military relations with regard to China's Strategic Missile Force (SMF); China's current strategic forces modernization program and its implications; the SMF's chain of command and leadership structure; and whether or not China's nuclear weapons contain use-control devices. The present study will be conducted in close conjunction with experts on nuclear security and nuclear weapons command-and-control at the Center for International Trade and Security/UGA. The study will utilize a variety academic publications, Chinese language newspapers and periodicals, and interviews of specialists on China's strategic forces and military affairs. Much like with the Soviet system over a decade ago, arms control experts have expressed concern about the reliability of China's command-and-control system in times of upheaval. A variety of centrifugal forces undermine the stability and continuity of the current regime. Rapid economic change, a weakening communist regime, growing numbers of riots and protests, and the political succession next year may contribute to potential future crises. Such crises could increase risks that China's nuclear controls could weaken or that these weapons could be used. This study identifies the weakest links in China's command-and-control system during crises, providing a useful framework for analysis of nuclear risks in China.

The Progress and Modernization of Former East German Healthcare after Communism

Sayan De, CURO Summer Research Fellow
Dr. Max Reinhart, Department of Germanic and Slavic Languages, University of Georgia

It is almost accepted fact that healthcare standards and methods of treatment in the developed world are relatively uniform. However, after the fall of the Iron Curtain, many distinct contrasts emerged both in the conditions of the facilities and the attitudes toward medical care. This study focuses on the efforts of the former East German sector to standardize healthcare services with the West from the perspective of healthcare professionals, public health officials, and objective health reports from various German cities. All subjective information was acquired through interviews and questionnaires with attending physicians (of various medical subspecialties) and spokespeople of health departments of six large cities in former East Germany. The interviews and surveys for physicians centered around, but were not restricted to, patient volume since 1991, the advances in technology, the frequency of continuing medical education, hospital funding for research, and their philosophy on modern patient care. Public health officials answered the same questions and also described trends in immunization, infant mortality, and public sanitation before and after 1991. The results of the interviews addressed a broad spectrum of opinions; however, a definite division of ideologies existed between older physicians educated under the communist system and younger physicians, who were raised during the communist regime, but educated after the fall of the Berlin Wall. The evidence seems to indicate a shift towards Westernization (i.e. capitalism) throughout the healthcare system, from the higher ranks of government and hospital administration to the patients.

Application of Bioinformatics for Analysis of Sorghum ESTs

Glorianne de Guzman and Joseph Moore, CURO Apprentices
Mrs. Aynsley Eastman, Mr. Manish Shah, Dr. Marie-Michèle Pratt, and Dr. Lee Pratt, Department of Botany, University of Georiga

At the Laboratory of Genomics and Bioinformatics at the University of Georgia, 117,924 high quality expressed sequence tags (ESTs) of sorghum that have been entered into the GenBank database. Bioinformatics has been used to analyze these ESTs for the discovery of Single Nucleotide Polymorphisms (SNPs), a variation in the genetic code at a specific point on the DNA. The location of SNPs serves as place markers in the sorghum genome allowing regions of gene expression to be identified. Although the majority of the SNPs may not affect the biology of the plant, they provide distinctions between individual genes. SNP analysis using bioinformatics has helped describe and create a detailed map to the genome of the sorghum plant. Bioinformatics, the science of using computers for organizing and processing biological data, allows scientists to decipher wet lab results in an ordered and systematic way. Computer programs such as Phrap, Phred, Polyphred, and Consed assign a numerical quality value to each nucleotide, align the sequences based on overlapping DNA regions, identify SNPs, and display the information in a logical presentation, respectively. These programs serve as tools of the bioinformaticist. The combination of these computer programs with a relational database makes it possible to analyze the massive amounts of data to compare DNA sequences and discover SNPs. After running Phred and Phrap, 10,697 gene clusters were identified by comparing high quality sequences to each other to look for homology. Ploy phred was then run on the gene clusters to detect SNPs by looking for high quality discrepancies in the same location in different contigs. Out of the 10,697 gene clusters, 625 sequences were assembled into 135 contigs and manually viewed to verify Polyphred results. 17 SNPs were confirmed in 5 of these contigs, resulting in 3.7% of the contigs viewed containing a SNP; therefore, by applying this percentage to the entire data set 396 contigs of the 10,697 contigs are hypothesized to contain at least one SNP. New techniques and data mining are being explored to find more efficient and economical means by which to locate and study SNPs. Success in this endeavor could provide a blueprint to mapping out other, more extensive genomes, such as the human genome.

Exploring Olfactory Response in *Drosophila melanogaster* and Evolutionary Theory of Aging

Lawrence Dougherty, CURO Summer Research Fellow
Dr. Daniel Promislow, Department of Genetics, University of Georgia

Experiments in biodemography have shown there is a genetic basis to aging. Aging is typically measured as the increase in probability of mortality. Many think that the cause of this increase is physiological decline. Experiments in gerontology have shown that genetically based physiological/behavioral traits of organisms change with age. The purpose of the current study is to incorporate approaches from both fields to more clearly understand the aging process. We hope to investigate the correlation between experimentally observed variation in aging and genetically based rates of change in physiological/behavioral traits. Genetically different lines of *Drosophila melanogaster* were studied by implementing experimental approaches from both fields. For demography, mortality data was collected. Olfactory response, a genetically controlled physiological trait, was examined for genetic variation at various ages to investigate age-related decline. Flies from each line were placed in a vial with a Q-tip treated with a fly repelling odor. The average number of flies located in the region of the vial farthest from the scent at time intervals was recorded to give an "avoidance score." The purpose of the study was to confirm that the test was sensitive enough to detect response differences and to see if results changed within lines as flies aged. For inbred female lines, significant genetic variation was detected in olfactory ability at an early age, and the rate at which the ability deteriorated showed variation as well. There is evidence to support continued study of genetic variation for physiological decline and eventually attempt to correlate olfactory response data with mortality data.

Refining the Pig Cloning Process: The Effect of Ovarian Follicle Diameter and the Amount of Cumulus Cells on *In Vitro* Maturation of Porcine Oocytes

Joseph Kirk Edwards
Dr. Kazuchika Miyoshi, Dr. Scott Pratt, Dr. Steven Stice, Department of Animal and Dairy Science, University of Georgia, and Dr. S. Jacek Rzucidlo, Prolinia, Inc.

In cloning procedures, there is considerable need for oocytes with superior ability to mature *in vitro*; however, the collection efficiency of such oocytes is hindered by the lack of evidence attributing maturation rates to any physical discriminating factors. It has been speculated, though, that ovarian follicle diameter and cumulus oocyte complex (COC) size may affect oocyte maturation rates, and thus, in this experiment, these factors are analyzed for such correlations. COCs collected from pig ovaries were separated into groups based on the diameter of the follicle they originated from (follicle diameter $<$ or $\geq$ 3mm) and the amount of cumulus cells surrounding the oocyte (COC size $<$ or $\geq$ 2x the diameter of the oocyte). The COCs were then cultured for a period of time, after which cumulus cells were removed and the oocyte's chromatin was examined under UV microscope to determine the maturity of each oocyte. Results of repeated tests showed that follicle diameter and COC size were not a factor in maturation progress after 24 hours, but rather were important at the 42 hours time span (the final stage of *in vitro* maturation); specifically, large follicles and large growths of cumulus cells favored an oocyte to reach nuclear maturity. In conclusion, oocytes derived from big follicles and having large cumulus cells investment exhibited superior ability for nuclear maturation. Therefore, these experiments showed that the tested criteria for aspiration and selection of COCs are crucial for obtaining high quality oocytes; these criteria can now be implemented in cloning procedures.

Evaluating the Moscow Center for Export Control's Role as a Non-Proliferation Epistemic Community Member

Matt Edwards, CURO Summer Research Fellow
Dr. Gary Bertsch, Department of Political Science, University of Georgia

The Moscow Center for Export Control (CEC) is a nongovernmental organization in Russia that runs seminars to teach private Russian firms proper export control compliance procedures. In order to understand whether the CEC may play a significant role in promoting export control compliance, it is necessary to understand what role the CEC plays *vis a vis* the targeted firms. Preliminary research indicates that an "epistemic community" is a *de facto* group of individuals and organizations that shares values, policy goals, and ideas of causal models. These groups may influence the actions of policy actors under conditions of uncertainty and ignorance. For the purposes of this research, the CEC is regarded as the epistemic community member, while private firms are treated as "policy actors." Information on the CEC was collected from four main sources. First, information on the "conditions of uncertainty" was collected from literature published by the CEC and other organizations. Second, witness accounts of the actual CEC seminars showed what information was presented to the "policy actors," and how it was presented. Third, interviews of individuals with extensive firsthand experience with the CEC provided insights on how effectively the CEC was providing this information. Fourth, the Center for International Trade and Security's (CITS) report to the U.S. government was used to determine the effectiveness of these seminars. Research indicates that where private firms are uncertain of export control compliance, the CEC can provide information that alters the rational calculations that businesses make. The CEC-provided information introduces new parameters into the decision-making process, decreases the costs, and increases the benefits associated with compliance. The theory predicts that under these conditions, the "policy actors" can be expected to behave differently after attending the seminars. The CITS report indicates that firms will behave differently after absorbing the CEC information, which supports the theory.

Shakespeare on Screen: Henry in Hollywood
Ben Emanuel, CURO Summer Research Fellow
Dr. Frances Teague, Department of English, University of Georgia

Part of a larger paper on the presence of William Shakespeare's canon in cinema, my presentation at the CURO Symposium would use video clips to explore the intertextual relations among two films deriving mainly from Shakespeare's *Henry IV, Part One* and *Henry IV, Part Two*: Orson Welles' *Chimes at Midnight* (1965) and Gus van Sant's *My Own Private Idaho* (1991). Implicit in this pairing is a double issue of adaptation: both filmmakers are interpreting Shakespeare's plays, but van Sant came upon the plays only through Welles' film and he alludes directly and extensively (despite his statements to the contrary) to his cinematic predecessor. The generation gap between the two directors, of course, makes for important contrasts between the two films. Thus, these two removals from the original texts sharpen the basic question of whether Shakespeare is still Shakespeare in productions on screen instead of on stage. In addition, they display the different approaches taken to adapting Shakespeare by two filmmakers of very different generations and traditions, one who spent a good bit of his career on Shakespeare (Welles produced and acted in stage productions and directed three Shakespearean films throughout his career), and one who has dealt with Shakespearean material only in the film at hand. The use of video clips in my presentation will allow me to detail the intertextual visual and cinematic relationships between these films in hopes of exploring their relationships to and removal from Shakespeare, keeping in mind the intertextual network of English chronicle histories and Elizabethan drama out of which the plays were originally born.

The Multicultural Experience: Pre-Service Education Students in Early Childhood Education Related to Multicultural Beliefs and Attitudes
Rodricus Ficklin, CURO Apprentice
Dr. Judith Reiff, Department of Elementary Education, University of Georgia

Given the increase of diversity in the United States public schools, all educators and students must face the reality of cultural diversity. This diversity takes place in and outside of the classroom. Often times, teachers are not trained in a diverse or multicultural environment. Introducing a multicultural curriculum or multicultural courses will provide pre-service teachers with the experience and knowledge that they need to be successful in teaching in a multicultural classroom. Information about various learning styles and concepts will be incorporated in this process. This investigation is an analysis of pre-service education students, and their multicultural beliefs and attitudes based on several administered instruments. Some of these instruments will include case studies, internet searches, readings related to diversity, and surveys.

Characterization of Nonlinear Viscoelastic Properties of Biomaterials through High-Speed Linear Based Transformation
Daniel Folkers, Jai Sikes, and Sam Utley
Dr. Guigen Zhang, Department of Biological and Agricultural Engineering, University of Georgia

This paper demonstrates how engineering principles can be applied to solve biomedical problems, such as characterizing the behavior of nonlinear viscoelastic materials. Viscoelastic materials exhibit stress/strain performance that is frequency, history, and path dependent. Likewise, a general mathematical expression is not available to describe nonlinear viscoelastic behavior. Characterization of the complex dynamic stiffness/modulus properties of nonlinear viscoelastic materials will help lead to optimization of biomedical and industrial products that utilize these materials. Common examples include medical devices, such as prosthetic limbs and orthopedic implants, manufacturing equipment, and consumer products. A new method to characterize nonlinear viscoelastic behavior has been developed. The new method employs analyzing the stress/strain response of a nonlinear viscoelastic material with Fast Fourier Transformation and high-speed data acquisition. With the new method, we demonstrate that nonlinear viscoelastic behavior can be characterized by our high-speed linear based transformation technique. These current findings are being used to design a physical apparatus to determine material characteristics of nonlinear and viscoelastic materials using both dynamic and static loading. It is our objective to produce such a device that is also highly accurate, user-friendly, and inexpensive for the public.

The Effects of Exercise on Brain Derived Neurotrophic Factor

Gregory Fonzo, CURO Apprentice
J.D Van Hoomissen, H. A. Chambliss, P. V. Holmes, and Dr. R. K. Dishman, Department of Exercise Science, University of Georgia

Brain derived neurotrophic factor (BDNF) is associated with depression. Exercise has been shown to increase BDNF in the hippocampus, similar to the antidepressant pharmacotherapy. This may provide insight into the biological mechanisms of the therapeutic effects of exercise on depression. The purpose of the study was to investigate the effects of exercise and antidepressant drugs on BDNF messenger ribonucleic acid (mRNA) in the olfactory bulbectomy animal model of depression. Male Long-Evans Rats (N=80) were randomly assigned using a 2 x 2 x 2 factorial design to the following conditions: 1) Sedentary (SED) vs. Activity Wheel (AW); 2) Saline (SAL) vs. Imipramine (IMP); 3) Sham (SHAM) vs. Olfactory Bulbectomy (OBX). All animals underwent either sham or OBX surgery, which requires bilateral removal of the olfactory bulbs. Rats were given daily injections (i.p.) of imipramine (10 mg/kg) or saline. One-half of the rats remained sedentary while the other half received an activity wheel in the cage. The entire experiment lasted 21 days. *In-situ* hybridization histochemistry with autoradiography was used to examine levels of BDNF in the hippocampus and dentate gyrus. There was a significant drug (SAL vs. IMP) x exercise (SED vs. AW) interaction ($p < .005$) in the dentate gyrus, and CA1, and CA3 regions of the hipppocampus. Chronic exercise elevated levels of BDNF mRNA in the saline but not the imipramine treatment groups. These results may help to examine the biological adaptations made in the brain following chronic exercise, which may help with the treatment and prevention of depression.

Effect of Fill Weight and Initial Temperature on Processing Time for a Home Pickled Jicama Relish

Holly H. Garner
Dr. Elizabeth L. Andress, Department of Foods and Nutrition, University of Georgia

The objective of this study was to determine the effects that typical consumer procedural variations have on heat penetration when processing pint glass jars of an acidified jicama relish recipe in boiling water. It is necessary to use thermal processing methods when making pickled products in order to prevent mold, yeast, and/or bacterial growth that produce spoilage when the product is stored. It was hypothesized that (1) as fill weight increases, required processing time will increase and (2) as initial fill temperature of jars decreases, required processing time will increase. To locate the cold spot for processing this product in pint canning jars, heating curve slopes (f_h values) were determined for each of five potential cold spots in each of 10 canner loads. Product temperatures were then measured at the cold spot throughout a 35-minute boiling water canning process for three treatments: control (standard canning procedure), high fill weight (HFW), and low initial temperature (IT). HFW resulted in decreased maximum jar temperature and a longer process requirement. A decrease of 5°C (64.5 vs. 69.7) in IT had no effect on either maximum jar temperature reached at the end of come-up (time to bring canner to boiling) or the 35-minute process at boiling. The major conclusion to be drawn from this study is that overfills should be avoided to insure expected heating rates and final maximum temperatures. Publishing a minimum number of jars to fill with a home canning recipe is one way to achieve this.

Structural Genomics Using a Model Microorganism

Brian Gerwe
Dr. Michael W.W. Adams, Department of Biochemistry and Molecular Biology, University of Georgia

The genome of *Pyrococcus furiosus,* a hyperthermophilic Archaeon, has been completely sequenced. The genome size is 1.908 Mbp and contains 2197 putative open reading frames (ORFs). The long-term objective in our laboratory is to develop a high-throughput cloning and protein expression system for use on a genome-wide scale. An analysis of the *P. furiosus* genome suggests that only about 23 % of the ORFs encode single subunit cytosolic proteins with no complex cofactors. It is evident that no single protocol will be able to accommodate expression of all proteins in the genome. The initial approach involves cloning each ORF into a modified *Escherichia coli* expression vector (pET-24d) such that the protein contains a N-terminal His-tag, $MA[H]_6GS$, used for affinity chromatography purification. Initial expression utilizes a range of standard growth protocols that are amenable to a high throughput procedure (i.e. temperature, growth media and inducer concentration) using commercial robotics. ORFs that do not yield soluble proteins in this protocol will enter alternative protocols that utilize conditions of increasing complexity. This will require the development of novel protocols to express genes that encode multisubunit proteins (mORFs), proteins that are membrane-associated, contain complex cofactors or a combination of all three. I will be presenting preliminary data on the cloning and expression of *P. furiosus* genes. Our initial results demonstrate a high success rate for both cloning and expression. Systematic variation of simple growth conditions greatly influences protein expression. This approach allows multiple conditions to be analyzed to optimize expression.

Relative Pathogenicity of Two Strains of Canine Distemper Virus Originally Isolated from Lions

Leah Givens
Dr. James Stanton and Dr. Corrie Brown, Department of Pathology, College of Veterinary Medicine, University of Georgia

Canine distemper virus (CDV) caused a 1994 epizootic among a population of lions in Tanzania's Serengeti National Park through contact of these lions with infected wild dogs. A similar outbreak occurred in 1991 and 1992 in captive felids at the Wildlife Waystation in San Fernando, California, resulting in the deaths of 17 cats, including leopards, tigers, lions, and jaguars. In this study, a post-mortem analysis compared ferrets infected with the African strain of the virus to those infected with the California strain, with an emphasis on the relative virulence and biology in each group after two, three, and four weeks post-infection. Immunohistochemical techniques revealed that the African strain tended to follow a stable course of infection with a less consistently fatal outcome when compared to the California strain. While ferrets infected with the California strain showed less viral load in the early stage of infection, the virus proved fatal for all such ferrets by four weeks post-infection. Some of the ferrets infected with the African strain, in contrast, developed only mild clinical signs and seemed to have recovered. However, at four weeks post-infection, viral antigen from the African isolate was detected in brain and salivary tissues. The significance of these particular findings lies in the discovery that the chronic nature of the African strain allows for increased viral transmission via salivary secretion, but may ultimately still prove fatal due to infection of the central nervous system.

Received with Open Arms; A Study of the Parable of the Prodigal Son
Drew Goldsmith
Dr. Katharina Wilson, Department of Comparative Literature, University of Georgia

Simply stated by both professors and critics alike, a parable is a story used to illustrate an idea. While the underlying concept of the parable as a form of teaching remains simple, its relativity to all people regardless of age, education, gender, or nationality has held steadfast through the ages. Because of his effectiveness and passion, a carpenter named Jesus drew large audiences of men, women, and children who were eager to listen to his parables. For example, all of society could emotionally identify with the themes and even with the characters within Jesus' parable of the prodigal son. Of utmost significance, the parable is still the perfect teaching tool, because the parable applies to all ages, influences all classes, and universalizes all themes. As I look at the effectiveness of the parable, my research includes interpretive, historical, as well as biblical influences. These three influences are critical to understanding the parable's continued use and impact upon varied societies and cultures.

Cell Wall-Degrading Enzymes from the Fungus That Causes the Devastating Rice Blast Disease
Jeff Halley
Dr. Sheng Cheng Wu, Department of Biochemistry and Molecular Biology, University of Georgia

The fungus *Magnaporthe grisea* is the pathogen responsible for the devastating Rice Blast disease. After entry into the rice plant, the fungus begins releasing xylanases that degrade xylan, an important component of rice cell walls. Six different xylanases have been discovered in *M. grisea*, and despite their importance, very little is known about how these enzymes function in *M. grisea*'s attack on the host. Because these enzymes are difficult to obtain they have yet to be studied in depth. Using genetic engineering technologies, we are now able to produce these enzymes in sufficient quantities for kinetic, structural, and biological studies. The heterologous organism we are investigating for xylanase production is *Pichia pastoris*, a eukaryotic fungus. We have shown that the *Pichia* cells transformed with each of the *M. grisea* xylanase genes result in the production of the enzyme under inductive conditions. Therefore, we are one major step closer to understanding precisely what role xylanases play in Rice Blast disease.

Identification of the NDV-Fusion Protein and NDV-Phosphoprotein in Transgenic Soybean Plants

Scott Harelik
Dr. Wayne Parrott, Department of Crop and Soil Sciences, University of Georgia

Newcastle Disease Virus (NDV) is one of the most serious problems affecting the poultry industry. The virus causes a major decline in the number of chickens produced for both commercial and economic purposes. For example, in 1971, the poultry industry in California suffered an outbreak of NDV. Eradication cost $56 million in federal funds and resulted in the destruction of 12 million birds. Preventive measures require the use of vaccines, achieved by inoculating chickens with either inactivated or live-forms of the virus. An extension of this method is the production of an oral vaccine using transgenic plants. Previous studies have demonstrated the effectiveness of using transgenic plants in the production of edible vaccines against a variety of other pathogenic antigens. In each of these studies, transgenic plants expressing pathogenic antigens induced an immune response in the host organism. The main objective of this project is to determine if NDV proteins produced in genetically engineered soybean (*Glycine max* L. Merr.) plants elicit an immune response in chickens (*Gallus gallus*). DNA sequences encoding two of the viral proteins, the phosphoprotein (P) and fusion (F) protein, were transformed into soybean plants by gene bombardment. This research will primarily investigate the immunogenicity of P. Although P has been shown to have a high amount of antigenicity, no research has been reported to show that P is immunogenic. If P is found to be immunogenic, then it could be used as an edible vaccine for NDV. DNA from transgenic plants will be analyzed for the presence of the transgene through Southern blotting. Thus far, eight lines have tested Southern positive: two containing the F gene and six containing the P gene. Lines testing Southern positive will be tested for the expression of the phosphoprotein and fusion protein through Western blotting. The immunogenicity properties of the plant lines expressing the P and F proteins will be determined through an immunoblot. An affinity-purified rabbit polyclonal antibody will be used as the primary antibody and a goat antirabbit-horseradish peroxidase will be used as the secondary antibody. Soybean lines producing an immune response in vitro will be tested in vivo.

Expression of Putative *Arabidopsis* UDP-Glucuronic Acid 4-Epimerase Genes

April Harper
Dr. Debra Mohnen, Complex Carbohydrate Research Center, University of Georgia

Pectin is an abundant polysaccharide found in the primary cell wall of all plants. Pectin is comprised of the complex polysaccharides homogalacturonan (HGA), rhamnogalacturonan I (RG-I), and rhamnogalacturonan II (RG-II). Each of these pectic polysaccharides contains large amounts of galacturonic acid (GalA). UDP-GalA is the activated form of GalA that is required for pectin synthesis. Thus, the enzymes that produce UDP-GalA are essential for pectin synthesis. In plants UDP-GlcA is converted to UDP-GalA by UDP-glucuronic acid 4-epimerase (UDP-GlcA 4-EP). We have identified and cloned several *Arabidopsis* cDNAs that likely encode several isoforms of this epimerase. The goal of the research was to express these putative *Arabidopsis* UDP-GlcA 4-EP genes and confirm their activity. Two experimental approaches were used. First, we transiently expressed the genes of interest in *Nicotiana benthamiana* plants using a tobacco mosaic virus (TMV) expression system. Whereas a control green fluorescent protein (GFP) construct did yield tobacco plants that produced GFP and fluoresced, the TMV:UDP-GlcA 4-EP infected plants expressed neither the putative UDP-GlcA epimerase mRNA nor the epimerase activity. We do not know why the TMV infected plants did not express the UDP-GlcA 4-EP genes. However, we propose that the TMV:UDP-GlcA 4-EP construct was unstable in the *Nicotiana benthamiana* plants. Our second strategy is to over-express the genes in *Arabidopsis*. Currently we are constructing plant binary expression vectors that contain the various UDP-GlcA 4-EP isoforms. *Arabidopsis* transgenic plants that over-express the putative epimerase will be generated and used to test for UDP-GlcA epimerase activity. The recovery of higher than background levels of UDP-GlcA-epimerase activity in the transgenic plants would be the first conclusive evidence that these genes do indeed encode functional UDP-GlcA-epimerases and would provide essential tools to study pectin synthesis.

Gene Expression in *Leishmania*: Control of Protein Synthesis in *Leishmania* 5' Untranslated Regions

Peter Harri, CURO Summer Research Fellow
Dr. Kojo Mensa-Wilmot, Department of Cellular Biology, University of Georgia

Efficient protein synthesis in prokaryotes and eukaryotes calls for different sequences upstream of coding regions. In the parasitic protist *Leishmania*, the 5'-untranslated regions (UTR) that promote prolific translation have not been defined. We have found that a 15-base sequence, termed Leishmania Translation Enhancer (LTE), positioned upstream of a reporter gene can influence protein synthesis 30-fold. We are interested in determining the essential sequences in *Leishmania* translational enhancer. Our experiments were designed to test if different sequences of the 5'-UTR of a reporter can affect translation in either *Leishmania tropica* or *Eschericha coli*. Using high fidelity PCR-mediated mutagenesis, mutant 5'-UTRs were linked to the coding region of a glycosyl phosphatidylinositol phospholipase C (GPI-PLC) gene from *Trypanosoma brucei*. We focused on a polypurine sequence AGGAGG, and produced related sequences TCCTCC, AGAAGA, GAAGAA, and GGGGAA. The AGGAGG was also deleted entirely from one 5'-UTR. DNA fragments were ligated into pBluescript II SK (+) for testing in *E. coli* and pUTK, a *Leishmania* expression vector, for expression in the parasite. After selection with ampicillin for *E. coli* and G418 for *L. tropica*, the cells will be assayed for the GPI-PLC enzyme activity, and specific activity of the enzyme will be determined. The results of this research are still pending. Currently, only 5 of the 10 desired mutations have been ligated into the desired plasmids, so no transformation or transfection has been performed. More cloning is needed to construct all of the desired plasmids. These studies will make contributions to our understanding of how *Leishmania* ribosomes decipher information in mRNA for the purpose of protein synthesis, which is important because gene expression is regulated post-transcriptionally in Leishmania.

Experimental Study of Male-Male Combat in a Parasitoid Wasp

Chris Hartley
Dr. Robert W. Matthews, Department of Entomology, University of Georgia

The parasitic wasp *Melittobia digitata* (Hymenoptera: Eulophidae) is a gregarious external parasite of various insects, including the common organ pipe mud dauber wasp. Sexual dimorphism in this species is extreme, and the males possess greatly enlarged mandibles. Males commonly engage in fierce, often fatal, fights with other males. The mandibles are the main weapons used, and injuries inflicted vary greatly in severity. This study had three objectives. The first objective was to determine whether engaging in fights was so energetically costly as to shorten a male's lifespan. The results supported this hypothesis. Males that had engaged in fights lived on average 9.65 days compared to isolated male lifespan of 12.3 days. The second objective was to determine whether fighting behavior changed with age. The hypothesis was that older males whose energy reserves would be nearly depleted would be more subdued fighters relative to young males. Isolated one-day-old and five-day-old inexperienced males were paired in observation arenas, and outcomes were recorded. Results supported the hypothesis; young males fought quickly and violently compared to older males. Older males fought less often and inflicted fewer and less severe injuries. The incidence of fatal fights, however, remained the same among young and old males. The final objective was to investigate whether males can learn to be more efficient fighters as a result of experience. It was predicted that winners of fights should, in subsequent battles, display more stereotyped fighting behavior and go for the "quick kill." Results are currently being analyzed.

Comparison of Several DNA Extraction Methods in Conjunction with PCR for the Rapid Detection of *Rhodococcus equi* and *Steptococcis equi*

Jessie Hopkins
Dr. Susan Sanchez, Athens Diagnostic Laboratory, College of Veterinary Medicine, University of Georgia

Rhodococcus equi and *Streptococcus equi* are bacteria that cause severe disease in horses. Using traditional bacteriology culture the isolation and identification of this organisms typically takes 48 to 72 hours. Polymerase chain reaction can facilitate the diagnosis of these bacterial infections. Bacteria can be detected within hours of sampling, and it is more sensitive and theoretically can detect fewer bacterial cells. Choosing the right DNA extraction method is crucial for diagnostic PCR. Our aim was to choose a reliable, rapid, and simple method for routine DNA purification from trans-tracheal washes, lymph node aspirates and swabs. Three different DNA extraction methods were examined namely, MasterPure ™, QIAamp® DNA kit, and guanidium thiocyanate DNA extraction. These protocols were compared quantitatively by using each method to extract DNA from three logarithmic serial dilutions of reference bacteria and three trans-tracheal washes and using these extractions for amplification using PCR, and visualization by gel electrophoresis. The MasterPure DNA purification kit allows for the detection of $2x10^2$ cfu/ml for *S. equi* and $6x10^2$ cfu/ml for *R. equi*. In contrast, QIAamp purification only allowed for the detection of $1.5x\ 10^4$ cfu/ml for *S. equi* and 10^4 cfu/ml for *R. equi*. Finally, guanidium thiocyanate extraction was as good as MasterPure for the extraction of *S. equi,* but only allowed for the detection of 10^5 cfu/ml for *R. equi.* All known positive clinical samples for either of the microorganisms were positive when extracted by the chosen method and amplified by PCR.

Formation of Hirano Bodies in Mammalian Cell Culture

Lindsay Hoskins
Rich Davis, Dr. Ruth Furukawa, and Dr. Marcus Fechheimer, Department of Cellular Biology, University of Georgia

Hirano bodies are paracrystalline, intracellular, actin-rich inclusions discovered in the brain specimens of patients stricken by neurodegenerative diseases such as Alzheimer's. Hirano bodies are present in several regions of the brain but most commonly found within the hippocampus. The role of Hirano bodies in the progression of disease is unknown. Recent findings have demonstrated that the expression of a mutated form of the 34kDa actin cross-linking protein in *Dictyostelium discoidum* induces the formation of Hirano bodies. This is the first *in vivo* model of Hirano body formation. The goal of this project is to develop a cultured cell model for studies of Hirano bodies in mammalian cells. Transiently transfected fibroblasts exhibited significant actin rearrangement to form large aggregations. Scanning electron microscopy demonstrated a significant alteration in the topography of the transfected cells. There are atypical cellular protrusions that are consistent in size and dimension with the Hirano bodies visualized by fluorescence microscopy. Cofilin, but not tubulin, is localized with these aggregations. These results support the interpretation that a model for formation of Hirano bodies in mammalian cells has been developed. This model can now be employed for studies of the cell type specificity of the response and the effects of Hirano bodies on cell function.

Use of a Non-Radioactive Gel Assay to Assess whether Protein Purification Separates a Pectin Degradative Activity from the Pectin Biosynthetic Enzyme Alpha-1, 4-Galacturonosyltransferase

Donte Howard
Dr. Debra Mohnen, Complex Carbohydrate Research Center, University of Georgia

The plant cell wall is composed of approximately 90% polysaccharide. About 30% of the polysaccharide in the cell wall of dicots and nongraminaceous monocots is pectin. Pectin is a polysaccharide with many biological activities and uses. It is a major component of fiber that has beneficial effects on human health. Pectin is also essential for plant growth, development, and defense against pathogenic attack. Homogalacturon (HGA) is the most abundant pectic polysaccharide accounting for 60% of pectin. HGA is a linear polysaccharide of a 1,4-linked alpha-D galactopyranosyluronic acid (GalA) residues that maybe methyl esterfied at C6. The enzyme that synthesizes HGA is galacturonosyltransferase (GalAT). The goal of my research was to use a non-radioactive polyacrylamide gel electrophoresis assay (GalAT PAGE assay) to study reaction products produced by partially purified GalAT. During efforts to purify GalAT in plant tissue extracts, it was previously found that an HGA degradative activity was also present. The activity degraded the GalAT reaction product and thus interfered with the analysis of GalAT activity during protein purification. Prior analysis of the degradative activity suggested that it was a putative exopolygalacturonase, an enzyme that degrades HGA. In this presentation, we use the GalAT PAGE assay to show that the HGA degradative activity present in *Arabidopsis thaliana* tissue extracts can be separated from GalAT during protein purification. The GalAT PAGE assay is also being used to determine if the degradative activity can be inhibited by high concentrations of galacturonic acid or digalacturonic acid, reaction products of the degradative enzyme. The results of these experiments will also be presented.

Ceramic Analysis at Lake Springs (9Cb22): A Late Archaic Site of the Savannah River Valley

Heather Howdeshell
Dr. Mark Williams, Department of Anthropology, University of Georgia

In 1951, Joseph Caldwell excavated the Lake Springs site (9Cb22) as the waters of the Clark Hill Reservoir on the Savannah River rose around him. While more than 10,000 artifacts had been recovered by him before the site was flooded, that collection had been lost for most of the last 50 years. In September 2001, the 23 boxes of artifacts from the site were discovered unlabeled at the Southeast Archaeological Center of the U.S. National Park Service in Tallahassee, and were transferred to the University of Georgia Laboratory of Archaeology in Athens. Caldwell never published a site report for Lake Springs, thus the overall objective of my project is to produce a final site report using his field notes, illustrations, and the recently discovered artifacts. In this specific paper I will present an analysis of the ceramic collection from Lake Springs. The majority of ceramics are Stallings Island Fiber Tempered bowls of plain and drag-and-jab varieties. These varieties suggest that the main occupation of the site was during the Mill Branch and Lover's Lane phases of the Late Archaic, between 2200 and 1350 B.C.

Screening Mutant Yeast Strains for Abnormalities in the Localization of snoRNA

Amanda Hudson, CURO Summer Research Fellow
Dr. Michael Terns, Department of Biochemistry and Molecular Biology, University of Georgia

The small nucleolar RNAs (snoRNAs) are located in the eukaryotic nucleolus. These RNAs are essential for the production of rRNA, which is involved in protein synthesis. The transport and localization of these snoRNAs to the nucleolus is not well understood. My project this summer was to participate in a screen of mutant *Saccharomyces cerevisiae* yeast strains, looking for phenotypic abnormalities in the localization of the U3 snoRNA. Each one of these mutant yeast strains contains a gene that has been mutated in a yeast genome. Thus, isolating the mutant yeast, that displays an abnormal localization phenotype, can identify the gene responsible for snoRNA localization. A collection of ~1,000 thermosensitive (t.s.) strains were screened. Using FISH (fluorescence in situ hybridization), the subcellular localization of the U3 snoRNA in wildtype and mutant yeast strains was determined using a DNA probe complementary to the U3 snoRNA with an attached fluorescent molecule, cy3. The concentrated DNA in the nucleus was stained with DAPI, a fluorescent stain. The normal and abnormal localization of the snoRNA could then be analyzed by fluorescence microscopy. The results from this screen identified 46 possible gene mutations involved in snoRNA localization. Of these 46 mutants, those that are found with outstanding abnormalities at the nonpermissive temperature (37°C) but not the permissive temperature (22°C) will aid in confirming the genes responsible for this localization. Ultimately, these genes will be studied further to understand the role of the identified gene product in the proper (functional) localization of the snoRNA.

Identifying Expressed Genes in Sorghum

Jacoby Hudson, Crystal Oliver, and Cassandra Kirkland, CURO Apprentices
Mrs. Aynsley Eastman, Mrs. Vickie Wentzel, Dr. Marie-Michèle Pratt, and Dr. Lee Pratt, Department of Botany, University of Georgia

Sorghum, a plant closely related to sugarcane and maize, is scientifically interesting due to its small genome size and ability to tolerate stress. The purpose of this sorghum EST, or expressed sequence tag, project is to identify expressed genes under various environmental stresses and from different tissues. 2,304 plasmids containing EST inserts were purified and sequenced to potentially allow for the identification and characterization of expressed genes. These plasmids contain DNA inserts which when sequenced allow for the identification and characterization of expressed genes. These plasmid DNA were first amplified in *E. coli,* and then lysed. The plasmid DNA was then purified by precipitating the bacterial membrane, proteins, and genomic DNA and then precipitating the plasmid DNA. The pure plasmid DNA was then thermal cycled to add fluorescent tags to each nucleotide in the DNA sequence, and sequenced via a 96 sample capillary electrophoresis machine. This machine produces images representing DNA sequences of expressed genes. Each side of the plasmid was sequenced to try and cover the entire length of the unknown EST sequence. This raw data from the sequences will be uploaded into a database where various computer programs analyze it for quality, *E. coli* contamination, and vector presence. Sequences passing quality control will be compared to public databases of other sequences for possible identification. Functional assignments could be made to other sequences hitting with a high homology to other sequences with a known function. Because these ESTs are sequences that come from expressed genes in sorghum, any sequences not hitting to known gene sequences could be potentially identified as a new gene.

It Was Broken, but They Did Not Fix It: Italian Election Reform in the Nineties

Eirin Kallestad
Dr. Christopher S. Allen, Department of Political Science, University of Georgia,

The purpose of this study is to investigate the Italian electoral reforms implemented over the last decade. In the early nineties, the Italian electoral system changed quite drastically. Reformers sought to create a stable, bi-polar political arena similar to the American one, but the Italians now resort to large coalitions consisting of parties or groups with differing foci. The new system created new problems without really solving the old ones. The reforms also caused the established parties to loose ground and new "parties" like Silvio Berlusconi's *Forza Italia* to prosper. This paper explores different aspects related to the electoral reforms. First, why were the reforms necessary? Secondly, how did the reforms fail? The reforms were crucial in a time of corruption scandals and little faith in the government. However, the party structure was falling apart *before* the reforms, due to a general decline in political culture. My study shows that while the reforms certainly contributed to the destruction of the established parties, they were not solely responsible. Therefore, political reorganizers must remember that officially implemented laws and reforms can only be successful if the environment they are inserted into is receptive.

Gender Differences in Internal and External Thought Focus among Prepubescent Children

Ryan Keen
Dr. Katherine Kipp, Department of Psychology, University of Georgia

Gender differences in cognitive response patterns to depression have been theoretically and empirically linked to the disproportionate numbers of women and adolescent girls experiencing depression (e.g., Nolen-Hoeksema, 1994, 1987; Ingram, 1990). Butler and Nolen-Hoeksema (1994) found that women tend to respond to depression by ruminating about their difficulties (i.e., internal focus), whereas men tend to distract themselves by focusing their thoughts on sports or other activities (i.e., external focus). This paper examines the developmental history of gender differences in internal and external focus by examining focus differences in third graders and a sample of college students. We posit that gender differences in internal and external focus might exist prior to the onset of gender differences in depression. Participants were drawn from 3rd grade classes at an elementary school and a large university, both in the southeastern United States. Each group included 40 students (20 males, 20 females) for a total of 80 participants. Focus of thought is being assessed using two free-thought measures. During six data collection sessions, individuals will either write their thoughts or draw for 10 minutes. Participant's writing transcripts are analyzed for focus of thought by first identifying all thought units and the coding each thought unit as being either internally or externally focused. The drawings are analyzed for thematic content. Correlations among tasks will examine the feasibility of using drawings as a metric of thought focus in younger children who are unable to complete written or verbal measures. Data analysis is underway, and no results are available at this time.

An Online Analytical Processing Approach to Single Nucleotide Polymorphism Discovery and Analysis

Dipinder Singh Keer
Dr. Marie-Michèle Pratt, Mr. Manish Shah, Dr. Chun Liang, Mr. Robert Sullivan, Mrs. Aynsley Eastman, and Dr. Lee Pratt, Department of Botany, and Dr. Mark Huber Department of Management Information Systems, University of Georgia

A Single Nucleotide Polymorphism (SNP) represents an alternate nucleotide in a given and defined genetic location at a frequency exceeding 1% in a given population. SNPs are considered to be a major source of phenotypic variability leading to differences in individuals within a given species. A variety of SNP analysis tools are available for detecting SNPs in the large volumes of data produced in high-throughput sequencing projects. The variation in the output format of these SNP detection programs and the need for further screening of the SNPs that are detected prompt the need for a data management process to standardize this data and make it available for aggregate analysis. This process involves the parsing of relevant data from these outputs, conversion to a standardized format, and storage of the data in a database designed for efficient mining, confirmation, and analysis. The relational database is designed to support ad-hoc querying and data mining of SNP data. A supporting query interface will be developed as an Online Analytical Processing (OLAP) tool for mining of SNPs from the data gathered. This approach will be demonstrated by accurate SNP identifications in sorghum and horse ESTs (Expressed Sequence Tags), which are representative data sets typical of sequence-based SNP discovery.

The Stevens Clinic – A Sports Medicine Facility

Emily Kirk
Dr. Jane Lily, Interior Design, University of Georgia

The design of a sports medicine clinic can play an important role in a patient's recovery from injury. Research indicates that an effective facility provides its patients with a comfortable, stimulating environment for treatment and exercise. The Stevens Clinic, a 21,000 square foot orthopedic and physical therapy suite, demonstrates how an interior can facilitate healing. This project investigates common solutions in sports medicine space planning. Interviews with a health care design specialist, a clinic manager, and a patient present key concepts in programming the space. A floor plan and rendered illustrations display conceptual design solutions for the practice. Written explanations accompany and clarify these drawings. The Stevens Clinic displays innovative space planning for recovering athletes and their physicians.

Utilization of Cover-Boards by Eastern Tiger Salamander (*Ambystoma tigrinum tigrinum*) Metamorphs at Brookhaven National Laboratory

Heather Kling
Dr. Timothy Green, Brookhaven National Laboratory, Upton, NY, and Dr. Karl Espelie, Department of Entomology, University of Georgia

The eastern tiger salamander has been designated an endangered species in New York State, and loss of habitat has been the primary factor contributing to its extirpation from heavily developed western Long Island. The intention of this investigation is to determine whether tiger salamanders demonstrate a propensity for use of artificial cover, and whether they exhibit any preference regarding board choice. The results of this experiment will contribute a basis for all future studies to better divulge salamander behavior relating to migration patterns immediately following emergence. For the cover-boards, half sheets of plywood were arranged around two ponds, determined by relative salamander population size, on the Brookhaven National Laboratory (BNL) site. Larval sampling was done by seining, carried out in approximately fifteen-minute sessions using a ten-foot minnow seine with quarter inch mesh. At only two of the ponds on site, one with a sample size just over 30 individuals and the other just under 30 individuals, were there significant larval salamander populations to warrant the placement of cover-boards. Measurements, including snout-vent length, total length, and weight, were taken on all salamanders sampled, both larvae and adults; these helped contribute to the hypothesized existence of age cohorts. There is difference between the ponds concerning numbers of adults sampled, totaling thirty-seven at one and eight at the other, as well as average sizes of individuals, notably larger at one than the other. Regardless of any difference between the two ponds, the salamanders demonstrated use of the artificial cover-boards showed little preference regarding specific board choice.

Analysis of Microsatellites in Sorghum ESTs

Dmitri Kolychev
Dr. Marie-Michèle Pratt, Dr. Lee Pratt, Mr. Manish Shah, Mrs. Aynsley Eastman, and Dr. Suchendra M. Bhandarkar, Department of Botany, University of Georgia

Finding SNPs, microsatellites, and other certain patterns in ESTs provides a key to understanding the genetic data. A database of ESTs provides the ability not only to find the microsatellites, but also gives a tremendous amount of ancillary information about the genes in which the microsatellites are found. Microsatellites, or simple sequence repeats, are genetic loci where several nucleotide bases are repeated in tandem. The utility of microsatellites is mostly due to slipped-strand mispairing during DNA replication, repair, or recombination; this makes them exhibit extreme length polymorphism, and they occur rather frequently in coding regions of DNA. Furthermore, since they can be easily analyzed by PCR using unique flanking primers, they are considered excellent genetic markers in making genetic linkage maps. This project involves not only building a database of high quality microsatellites found in sorghum ESTs but also searching for the effect these microsatellites have in different genotypes. An extra repeat within the microsatellite could have tremendous effect on the phenotype of an organism; likewise, a mutation within a microsatellite locus could have either disastrous or beneficial consequences for the organism that carries it. A careful analysis of obtained data will yield the stochastic link between the occurrence of certain microsatellites in different genotypes; however, final results are not yet known since extensive review is still under progress.

Differential Glycosylation of Normal and Neoplastic hCG

Marina Kozak
Dr. J. David Puett, Department of Biochemistry and Molecular Biology, University of Georgia

Human chorionic gonadotropin (hCG), one of four related heterodimeric glycoprotein hormones involved in reproduction and metabolism, is produced by the trophoblastic cells of the placenta during pregnancy. Some malignant cells also produce hCG with a glycosylation pattern different from that of normal cells. Previous glycosylation studies required purification of large quantities of hCG, restricting the analysis of many transformed cell lines. The goal of this study was to develop an ELISA to rapidly examine the differences in glycosylation profiles between hCG produced during pregnancy and malignancy, concentrating mainly on trophoblastic disease. An antibody fragment, devoid of oligosaccharides, with affinity for the hormone-specific β subunit was coated onto polystyrene 96-well plates in order to capture the hormone from the cell media. The glycosylation pattern of the hormone was then probed by a series of 11 biotinylated lectins. Lectin binding was indirectly quantified by subsequently binding sptrepavidin-HRP and measuring colored substrate production on a plate reader. It was determined in 3 independent experiments that hCG from a human choriocarcinoma cell line (JAR) contains increased fucosylation based upon increased binding of an *Aleuria aurantia* lectin, as well as the presence of O-linked galactose β(1-3) N-acetyl galactose and triatennary branching determined by the lectins *Amaranthus caudatus* and *Phaseolus vulgaris* leukoagglutinin, respectively. If the glycosylation signatures of hCG derived from transformed cells of many tumors, e.g. reproductive tract, lung, colon, etc., can be determined and distinguished through an easily performed assay, the role of hCG as an early marker of cancer will expand to provide information on the localization of the tumor.

Development of Cognitive Inhibition in Preschool Children

Meenakshi Lambha
Sarah Cummins-Sebree and Dr. Katherine Kipp, Department of Psychology, University of Georgia

Cognitive inhibition is a theoretical construct explaining the suppression of cognitive contents or processes which had been previously activated; in addition, it is thought to develop during early and middle childhood. Cognitive inhibition is important in developing efficient memory skills; being able to inhibit the maintenance of irrelevant information in working memory allows one to use more of the memory store for remembering relevant information and performing other cognitive processes. Previous research indicates that school-aged children (first through fifth graders) are able to inhibit irrelevant information in various memory tasks. However, considerable frontal lobe development occurs during the preschool years, which has been implicated in cognitive inhibition abilities. The purpose of our study is to test 40 preschoolers' (ages 3-6) abilities to inhibit prepotent responses, as well as assess construct validity, in three cognitive inhibition tasks (modified Stroop task, picture naming task, and directed-forgetting task) and one vocabulary test (Peabody Picture Vocabulary Test-Revised). We will also test 20 adults for a comparison control group. We hypothesize that there will be differences in responses among the 3-4.5 year-old group and the 4.5-6 year-old group, such that the older preschoolers will exhibit higher levels of cognitive inhibition than the younger preschoolers. Independent t tests will be used to compare performances of the two preschool groups on our tasks. Findings from this study will enhance our knowledge of cognitive inhibition development in young children. Currently we are beginning data collection on our research.

Motivations of U.S. Southern Homegardeners: Preserving the Past in a Modern World

Crystal Leaver
Dr. Virginia D. Nazarea, Department of Anthropology, University of Georgia

The purpose of this study was to discover the different motivations that homegardeners and farmers in the Southeastern United States have for growing heirloom, or traditional varieties of crops. Through the content analysis of interviews, this paper examines the motivations that prompt gardeners to persist in cultivating heirloom varieties with no institutional support. It compares the motivations of women and men, as well as older and younger growers. My research found that older growers were more likely to grow heirlooms because of tradition and utilitarian reasons, and younger growers grow heirlooms because of personal preferences and as a conscious effort to conserve biodiversity. Since the adoption of industrial agriculture and the Green Revolution, farmers and even homegardeners have replaced their local varieties with high yielding and high input hybrid crops. Local varieties are disappearing at an alarming rate, contributing to the worldwide decrease in crop biodiversity. However, many people in the U.S. among other places refuse to conform to these trends and continue to cultivate heirloom varieties.

The Colorfastness of an Interlock T-shirt Material Laundered with a Detergent Compared to Laundering with a Detergent Plus Enzyme

Shelley Ledford
Dr. Nolan Etters, Department of Textiles, Merchandising, and Interiors, University of Georgia

The purpose of this study was to see if adding enzymes to the home laundering would prevent the color loss on T-shirts. I used AATCC Test Method 124-2001 Appearance of Fabrics after Repeated Home Launderings, Standardization of Home Laundry Test Conditions developed by AATCC Committee RA88, 1993 AATCC Standard Reference Detergent and Laundry Detergents in General developed by AATCC Committee RA88, Instrumental Color Measurement developed by AATCC Committee RA36, Instrumental Assessment of the Change in Color of a Test Specimen developed by AATCC Committee RA36. I bought six yards of purple, red and orange t-shirt material. I cut a swatch out of each of the original materials as a controlled sample. Then I cut the purple fabric into two equal sized pieces and labeled the left piece A and the right piece B. Piece A was only laundered in the detergent while piece B was laundered in the detergent plus 1g of cellulase enzyme. I used cellulase because it is a natural catalyst that accelerates the hydrolysis. I dried the fabric and then cut a swatch and took a reflectance reading on the spectrophotometer. I measured the color range for piece A and for piece B after the first, the fifth, the tenth, the fifteenth, and the twentieth washings. The expected results should reveal that the material washed with detergent plus cellulase will appear vivid, while the material washed with just detergent will have pills. The pills will make the light scatter rather than absorbed, making the color dull and shaded. Many Americans use t-shirts as their own personal billboard to the world. I want my t-shirt's color to be as brilliant as my message. This project has taught me how to preserve the color quality of new t-shirts.

Neuropeptide Y as a Factor in Ethanol Consumption in Zucher Rats

Rachel Lewis
Dr. Gaylen Edwards, Department of Physiology and Pharmacology, University of Georgia

Past studies have shown that neuropeptide Y (NPY) injected intracerebroventricularly (ICV) increases feeding behavior while decreasing measures of anxiety. One study found that consumption of a sucrose solution increased while the amount of ethanol solution consumed did not change following ICV injections of NPY. It was hypothesized that ICV injections of NPY could be affecting receptors in both the hypothalamus (increasing feeding behavior) and the amygdala (resulting in decreased anxiety). Additionally, NPY and ethanol have similar anxiolytic effects. The present study hypothesized that NPY or NPY antagonists injected into the amygdala of Zucker Lean (ZL) or Zucker Obese (ZO) rats would decrease or increase consumption of a 5% ethanol solution (5%EtOH) respectively. The ZL (N=3) and ZO (N=5) rats were housed in separate cages with ad libitum access to 5%EtOH and water. The amount of 5%EtOH consumed was recorded daily prior to injections, during vehicle injections, injections of NPY (.5 μg for 3 days), during injections of NPY antagonist (1 μg for the first 3 days and then 2.5 μg for 2 days-day 3 was lost), and for 1 week after injections were complete. All doses were based on doses reported in the literature. Results showed that NPY suppressed intake and NPY antagonist increased intake in both strains when compared to amount of ethanol consumed prior to and during vehicle injections. Therefore, each animal serves as its own control. Future studies will examine methods to alter NPY levels and test whether these are useful in the treatment of alcoholism.

Improvisation in the Choreographic Process

Elizabeth Lide
Dr. Bala Sarasvati, Department of Dance, University of Georgia

This study will explore approaches and use of improvisation in creating contemporary modern dance choreography. An overview of the history of improvisation in the United States since the 1960's will provide a contextual base for this study, which will proceed to examine the choreographic processes of three selected prominent postmodern choreographers who use improvisation as a base for developing movement vocabulary. I will compare and contrast their methods, and through experimentation, develop my own approach. In the process, I will conduct rehearsal labs to develop a choreographic project. This project will be presented in both live and edited film versions at the CURO Symposium.

Ferdinand Warren: Artist, Craftsman, American Aristocrat
Andrew Littlejohn
Dr. William Eiland, Department of Art History, Georgia Museum of Art, University of Georgia

When speaking with Ferdinand Warren's dealer, Ann Jacob, she described him as "an American aristocrat." Perhaps there is no better way to sum up this handsome, humble, hardworking, and creative artist, for he was the epitome of old world American class. Born in Independence, Missouri, in 1899, Ferdinand Earl Warren traveled to New York City on a Tiffany Fellowship in 1926 where he established himself among the likes of the American Eight and other notable expatriate artists. Lamar Dodd brought Warren to the University of Georgia in 1951 as an artist-in-residence. A mature 52-years-old, Warren's works of art were already displayed in notable venues such as the Metropolitan and Brooklyn Museums of Art. After a successful year at the University of Georgia, Warren attained a faculty position at Agnes Scott College as head of the art department. During his eighteen-year tenure at Agnes Scott, Warren settled into a southern groove and continued to develop his disparate style. He never ceased to try any and every artistic method, exemplary in his oeuvre of oil paintings, encaustics, enamels, jigsaw puzzles, and woodblock Christmas cards. The purpose of my research is to resurrect an interest in Ferdinand Warren with a catalogue raisonne and a potential exhibition at the Georgia Museum of Art. However, I believe my research is more important than merely to induce interest in a virtually unknown artist. Little to no research has been conducted on Ferdinand Warren, and this is historically irresponsible and quite unfortunate. During my examination of Warren, I have visited numerous private and public collections, which have taken me as far as Houston, Texas. Additionally, I have consulted the Hargrett Rare Books Library, the Georgia Museum of Art's collection and files, Agnes Scott College's resources, and I have corresponded with various museums and Warren's acquaintances all across the United States and Canada. Ferdinand Warren was a benevolent and loving friend, family man, and teacher, and for these reasons, not to mention his excellence as an artist, it will be an honor to enlighten the public on Ferdinand Warren's art through my efforts and those who have helped me discover this true "American aristocrat."

A Data Envelopment Analysis of the Efficiency of Georgia Politicians
Chandler McClellan
Dr. David Mustard, Department of Economics, University of Georgia

Previous studies have proven that sheer spending in elections is not statistically significant. Therefore, this study examined if the efficiency with which a candidate spends money can affect electoral outcomes. To accomplish this goal, this study used Data Envelopment Analysis to measure the technical efficiency of candidates for the 2000 Georgia House of Representatives. However, there are many factors in an election that a candidate has no influence over but are included in this measure of candidate technical efficiency. Such factors include the candidate's personal characteristics, his opponent's level of spending, and district characteristics. A second stage regression is used to factor out the influences of these variables that a candidate cannot influence, thereby yielding the candidate's pure efficiency. When compared with the technical efficiency scores, these pure efficiency scores show which candidates do well because they are efficient and which do well because they run in a favorable district. Therefore, the pure efficiency measures can be used in allocation of scarce campaign resources or as a proxy for candidate quality in other studies on campaign spending. In nearly all races studied, the candidate with the more efficient scores won. In races in which the less efficient candidate won, the winner significantly outspent his opponent. The results of this study are consistent with the results of a similar study by Dennis Coates, leading to the conclusion that the efficiency with which a candidate spends his campaign money will affect the outcome of the election. Though this study's results are compelling, additional observations and regression variables could improve the accuracy of the pure efficiency scores.

An Analytical Study of Interfacial Stresses in Bonded Materials
Cliff McLeroy
Dr. Guigen Zhang, Department of Agricultural and Biological Engineering, University of Georgia

The goal of this project was to develop an analytical solution for the interfacial stress distribution of bonded materials as a function of force, deflection, and material properties. Currently the evaluation of the bonding strength of adhesives for possible dental crown applications is performed with a three point bending test. The specimen consists of a thin metal strip supported on its ends with a ceramic material bonded to the bottom. The two quantities obtained through this type of experiment are the deflection of the strip and the load applied. The difficulty was to obtain an accurate measurement of the bonding strength based on the load-deflection curve without knowing the interfacial stress distribution. Since the stress incurred by the bond is due to the tendency of the strip to bend and change shape, it is not constant. There are normal and shear stresses that occur at the bond which both vary along the length of the bond. In this study, solutions of the interfacial stress distributions were developed through the use of an advanced engineering technique called the Theory of Elasticity. This technique provides a high level of accuracy that is not obtainable through other methods such as Mechanics of Materials. Following this, parametric studies were performed which provided graphs, charts, and computer code for the stress distribution along the bond interface. The uniqueness of this study is that it allows dentists and non-engineers to accurately interpret test results based on the load-deflection curve.

Synthesis and Use of Caged Compounds to Explore Cellular Processes
Kenneth Miller, CURO Summer Research Fellow
Dr. Timothy Dore, Department of Chemistry, University of Georgia

Caged compounds are drugs or other biological effectors that are rendered biologically inactive through coupling to a light sensitive molecule known as a caging group. The caged compound can easily be converted to the biologically active, uncaged form by pulsing the caged molecule with either IR or UV radiation. Such a drug delivery system is advantageous in that a dramatic increase in drug concentration can be achieved in the very short time period of a light pulse. However, in order to obtain tight spatial as well as temporal control of drug release, multi-photon excitation can be employed. Multi-photon excitation occurs when a molecular cage absorbs two or more photons simultaneously and subsequently releases the effector; the process is limited to the focus of a pulsed IR laser due to the necessity of a large photon flux. Therefore, one can achieve an excellent level of three-dimensional selectivity of the release of a biological effector by focusing the laser on an area of interest such a dendrite in a single neuron. Bromohydroxycoumarin (Bhc) is a biologically useful caging group that undergoes two-photon excitation using a 740 nm laser, and others have used Bhc caged glutamate to study glutamate sensitivity in neurons. Utilizing a Pechman condensation of 2,7-dihydroxynaphthalene and ethyl acetoactetate and a number of other synthetic steps, a new series of caging groups were synthesized, which absorb higher wavelengths of light compared to Bhc. Such “extended coumarins” contain an additional conjugated ring facilitating the absorption of longer wavelengths of light, which are less energetic and cause less damage to living cells. Tribromo-, dinitro-, and monofluoro- extended coumarins were synthesized, and the tribromo product shows two photon uncaging at 800 nm.

Transgenic Study of a Conserved Neuropeptide Network for Feeding Regulation in *Drosophila*
Eric Morishige
Dr. Ping Shen, Department of Cellular Biology, University of Georgia

Hypothalamic neuropeptide Y (NPY) stimulates the appetite. Leptin-deficient mice, which are obese due to excessive appetite, show over-expression of NPY in the hypothalamus. Furthermore, mice deficient in both leptin and NPY show attenuated obesity symptoms, indicating a role of NPY in body weight control. Neuropeptide F (dNPF), the *Drosophila* homologue of NPY, has been identified. This study aims to use dNPF as a model to understand the mechanism and role of NPY signaling in regulating feeding behavior. Transgenic flies were used to analyze the effects of over-expression of dNPF on the nutritional levels of the flies. Glucose, glycogen, and lipid levels of the individual flies were analyzed according to the protocol described by Van Handel and Day (1988, J.Am. Mosquito Control Association, pp549-550). Each Fly was homogenized and the Glycogen was precipitated into a pellet, while the glucose, and lipids were dissolved into solution. Colored reactions were then carried out, and a spectrophotometer quantified the results. Preliminary experiments tested male and female flies of wild type, and over-expression lines (between 6 to 12 flies each). Initial results suggest that flies with an excess of dNPF may contain significantly more fat than their wild type counterparts, and appear to convert glucose into glycogen at a much slower rate. These results suggest that *Drosophila* can be a good model for studying the molecular mechanism of the signaling pathways involved in obesity and diabetes. Verification of the results is currently being carried out.

Fish Oil: The Effect on Insulin Sensitivity When Incorporated into a High-fat Diet
Sara Morris
Dr. Dorothy B. Hausman, Department of Foods and Nutrition, University of Georgia

This research project tests the hypothesis that the inclusion of fish oil in a high-fat diet will increase insulin sensitivity and lower insulin resistance. Three groups of 10 male Swiss mice have been assigned either to a low-fat control diet (10% calories from fat) or to one of two high-fat diets. The high-fat control diet consists of 39.39% lard and 5.54% soybean oil; the high-fat experimental diet consists of 29.40% lard, 5.54% soybean oil, and 9.98% fish oil. The mice are being fed ad libitum for approximately eight weeks with food intake and body weight measured weekly. At four weeks the effectiveness of these diets on inducing insulin resistance was assessed *in vivo* using insulin sensitivity tests by fasting the mice for five-seven hours and collecting tail blood samples prior to and at 15, 30, 45 and 60 minutes after administration of insulin (0.75 U per kg). Blood glucose concentration was analyzed at all time points and serum insulin at 0 and 15 minutes only. The data were analyzed one-way by ANOVA with post hoc Duncan's multiple range test. Results after four weeks indicate a significant increase ($P<0.05$) in food intake and body weight in the fish oil group as compared to both control groups. Insulin sensitivity tended to be decreased in the control high-fat group but not in the fish oil high-fat group, although the difference was not statistically significant ($P=0.058$ vs. low fat). Thus, inclusion of fish oil in a high fat diet may have a protective effect against the development of insulin resistance.

“each morning I get up with one word in mind: plastik…”
Lorina Naci, CURO Summer Research Fellow
Professor William Paul, Jr., School of Art, University of Georgia

From 1945-1989 Central and Eastern European countries adopted Communism as an economic, political, and social system. The Communist radical ideological and physical culture, characterized by the lack of material goods, changed the cultural traditions of the Eastern European countries, as it was superimposed on all facets of human life. After twelve years of shifting towards democratic systems, the citizens of these countries are feverishly anticipating the harvest of this transition: full integration into the capitalistic global village. Homogenization with Western European structures affords these countries unprecedented opportunities. Scholars perceive that the political-economical phenomena of multiculturalism and globalization are manifestations of the dominance of the western cultures, and that by colonizing the rest of the world equally as its place of origin, globalization causes social and cultural uniformity. The cultural threats and the ethical dilemmas caused by globalization, such as the suspension of the personal and the native in the face of the industrially and technologically advanced other, are the focus of my current research and artistic work.

Chinese Classical Dance
Lynn Nguyen, CURO Summer Research Fellow
Dr. Mark Wheeler, Department of Dance, University of Georgia

As it is understood in the field of dance research, ethnography is the writing of people to discover the cultural knowledge they are using to organize their behavior and interpret their experience. This research uses an ethnographic approach to study the culture of the Chinese-Americans through the understanding and knowledge of Chinese dance. The approach relies on the method of participant observation, which included thirty-two hours of Chinese classical dance instruction over an eight-week period plus interviews with students, teachers, and choreographers, and observations of classical, folk, minority, and contemporary Chinese dance performances. The research gives not only an introduction to the role of Chinese dance within the Chinese-American culture, but it also makes connections between Chinese classical dance elements and Chinese contemporary dance themes. Three individual classical dances—the feather fan, long sleeve, and sword—will be demonstrated, followed by a short oral report presenting the conclusions drawn from this research.

Factors Affecting Male Longevity in a Parasitoid Wasp
Matthew David Oliver
Dr. Robert W. Matthews, Department of Entomology, University of Georgia

Melittobia digitata parasitoid wasps develop gregariously in groups of 100 to 800 (depending on host size). They are unusual among insects in that the sex ratio is extremely female biased (95:5). Furthermore, males engage in lethal combat and survivors mate only with their sisters, never leaving their host's cocoon. Because fighting, courtship, and mating are energetically costly, males may exhaust their energy reserves before mating with all their sisters, potentially reducing their fitness. Some previous researchers have claimed that males obtain all their nourishment as larvae and do not feed as adults. Others suggest that males opportunistically feed on defeated males or other females. This study used male longevity as an indirect measure to assess whether males may obtain supplemental nutrition. The overall hypothesis was that if males are provided opportunity to obtain food, then they will live longer than controls. Potential food variables present in nature include hosts, other adults, and pupae of both sexes. These variables were experimentally manipulated in the laboratory. Ten Experimental treatments in which individual males were given direct or indirect access to various combinations of potential food were replicated 20 times at 25^{o}C and male longevity was recorded. Results are still incomplete but will be analyzed in time for presentation. They will be interpreted in the context of the natural history of this unusual insect.

In the Room: a Performative Text of Story, Poetics, and Criticism
Julie Orlemanski
Dr. Richard Menke, Department of English, University of Georgia

This project will demonstrate some of the ways language performs narrative, narrative not limited to a single identifiable plot but working in a number of intersecting discourses. In this text, an original short story entitled "In the Room," the aleatory, the temporal, the spatial, and the visual emerge from a place formerly perceived as static and transparent – the page. The text literally becomes multi-dimensional and interactive. "In the Room" contains three distinct but codependent narratives – the subject of the story, an account of its structuring, and the response of the reader. The narrative plotline will thus give rise to the two meta-narratives, one of the writer's creation and one of the readers' experiences. How one balances all these in the making of and responding to literature will be the synthesis of the three elements of the project. Each time another reader enters the room of the text, another performance begins. This is your invitation to come in.

Music Therapy with Premature Infants

Cori Pelletier, CURO Summer Research Fellow
Dr. Roy Grant, Music Therapy, School of Music, University of Georgia

Premature infants experience many complications after birth, including, but not limited to, low oxygen saturation levels, low birth weight, apnea or bradycardia episodes, and a lack of nutritive sucking skills, all of which may increase the length of hospitalization. Researchers have shown that music, contingent on nonnutritive sucking, may help develop nutritive sucking skills resulting in increased weight gain and oxygen saturation levels, decreased apnea or bradycardia episodes, and shortened length of hospital stay. Still data are inconclusive as to when to administer music therapy, such as the time of day, time in relationship to infant's feeding schedule, consecutive versus nonconsecutive days of music, and the best gestational age at which to begin. As part of my summer research fellowship I participated in studies addressing some of these concerns. The first involved 69 trials by 10 randomly selected premature infants to determine the effect of time of day, morning vs. afternoon (8:00am and 2:00pm), on the amount of time engaged in nonnutritive sucking during contingent music. Our hypothesis was that there would be no significant difference due to the controlled environment of the Special Care Nursery. The results of a t-test approached .10 so the hypothesis was accepted. Next we analyzed the relationship of the infants' feeding schedules on the amount of time spent in nonnutritive sucking during the contingent music, as some researchers have suggested that music therapy best occur during the hour post feeding during a typical three-hour feeding schedule. We divided the three-hour feeding schedule into five blocks: 30 minutes during feeding, 31 to 60 minutes post feeding, 61 to 120 minutes post feeding (deep sleep), 121 to 150 minutes, and the fifth block 151 to 180 minutes. Results were: Block One -78%, Block Two -57%, Block Three -54%, Block Four -73%, and Block Five -71 %. Contrary to previous research those babies in Block One produced 78% music during feeding, but our nurses frown on this time because of the frequency of reflux. Block Four produced 73%, Block Five 71 %, Block Two 57%, and Block Three 54%. Therefore, results indicate that more babies suck longer without ill effects during nonnutritive sucking with contingent music prior to feeding. At a later date attention will be given to the effects of the feeding schedule as the number of subjects increase. In the third statistical analysis we measured the percent of music and the average segment of music on the third consecutive day vs. the third nonconsecutive day of music therapy for 26 and 20 infants, respectively. Our hypotheses were that infants with a third consecutive day of music would have higher scores; the hypotheses were accepted. Infants with three consecutive days of music averaged two and one half times larger segments of music, $p < .05$. Those infants having music three consecutive days had significantly greater overall percentage of music, $p < .01$. Data are still being compiled as part of a regional study to determine the best gestational age to begin music therapy, the length of stay in the Special Care Nursery, days until first successful bottle feeding (PO), and weight gain, all with control and experimental groups.

Chimpanzees' Manipulation of Objects within the Hand

Linda Pierce and Christine Oshansky
Dr. Dorothy M. Fragaszy, Department of Psychology, University of Georgia

Are humans unique in how we use our hands to manipulate objects? To move an object held in one hand, humans use individuated movements of the digits in simple synergies, reciprocal synergies, sequential patterns, and palmar combinations. Simple synergies are movements in which all the digits are converging simultaneously. Reciprocal synergies include digit flexion and extension. Movements that involve multiple digits performing the same pattern at different times are termed sequential patterns. Palmar combinations are hand movements in which the object is held stationary in the palm while manipulated with the digits. To determine if chimpanzees could use their hands in the same way as humans, we analyzed three adult female chimpanzees' actions with objects held in one hand. Each subject inserted five differently shaped objects through corresponding holes in a vertical panel. The chimpanzees were encouraged to complete three insertions with each shape on each of three observation sessions. We scored the seven to 36 actions per individual that were clearly visible on videotape. We identified every class of movement described for humans at least once in our sample from the chimpanzees. Chimpanzees evidently have the ability to move objects held in one hand using individuated digital movements in the same way as humans. The next challenge is to determine if any species of monkey has similar abilities to control the digits of the hand while manipulating an object.

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Georgian Computer Usage

Charlie Pitts, CURO Apprentice
Dr. James Bason, Survey Research Center, University of Georgia

This research will examine the relationship between computer usages, choice of computer operating system, and demographic characteristics (age, income, education, and gender) of Georgia residents. Previous research has indicated that increasing levels of education and income are positively associated with computer usage. The present study will examine those relationships among Georgians. Additionally, this research will examine the incidence of operating systems and office software packages. Both Microsoft's Office suite and Windows operating system command a substantial portion of the world's share in their respective markets. This research will examine these findings in the context of Georgia residents. Data for the study was collected utilizing the annual Georgia Poll survey done by the Survey Research Center of the University of Georgia. For the Georgia Poll, 400 randomly selected Georgia households were contacted and interviewed about a variety of questions including those related to the research. Descriptive statistics univariate frequency distributions will be presented and bivariate analyses will be conducted to test for statistically significant differences among sub-groups in the population. Findings from the present study will be compared and contrasted with national and international data.

Public Perception of "FONAG:" An Ecuadorian Watershed Sustainability Program Case Study
Jeffrey Pugh
Dr. Fausto Sarmiento, Center for Latin American and Caribbean Studies, University of Georgia

In 2000, the city of Quito, Ecuador began working toward protecting the ecologically fragile watershed area from which its drinking water was drawn. In order to do this, the independent Fund for the Conservation of Watersheds (FONAG) was launched to finance sustainability projects designed to ensure that the Papallacta watershed could remain a long-term source of drinking water for Quito. FONAG is funded in part through startup grants from several organizations and a 1% fee on all Quito water bills, but it has been unable to build an endowment comfortable enough to begin implementing projects. The present research measures perceptions of the fund by 41 Quito citizens from two universities. It also evaluates the quality of the fund's proposed communication campaign based on existing communication theory and attempts to explain the findings in terms of an adapted environmental education model. Hydrological protection measures, such as erosion controls in the watershed, should be implemented quickly as they were supported by 76 percent of those surveyed. Indeed, their absence was cited as a reason for the U.S. Agency for International Development (USAID) withholding assistance from the project. These measures would result in tangible improvements in watershed quality and would be useful in attaining international funding, which FONAG desperately needs to build its endowment. In order to motivate Ecuadorians and foreigners to support the FONAG project politically and financially, communication theory suggests that the communication plan must be more focused on showing direct economic benefits of the proposed projects.

The Relationship between Critical Flicker Fusion Thresholds and Resting Systolic Blood Pressure
Jennifer Reingold
Dr. Billy R. Hammond, Vision Sciences Laboratory, Department of Psychology, University of Georgia

Many visual diseases involve vascular complications. Consequently, understanding the interactions between the visual and cardiovascular system is important. In the present study, the relationship between critical flicker fusion thresholds (CFF) and resting systolic blood pressure (SBP) in 82 males and 113 females recruited from the UGA student population was assessed. CFF was measured as a holistic index of visual function using a 1-deg, 570 nm test stimulus. Flicker thresholds were determined using an ascending method of limits (beginning supra-threshold at approximately 12 Hz). Fusion thresholds were determined using a descending method of limits (beginning at around 30 Hz for most subjects). Critical flicker fusion thresholds were calculated as the average of the flicker and fusion thresholds. SBP was measured using an automated sphygmomanometer. The overall relationship between SBP and CFF was highly significant ($Y = 18.0 + 0.04X$, $r = 0.26$ $p<0.0002$). A positive relationship between SBP and CFF indicated that changes in cardiovascular function are directly related to changes in visual function in normal, non-diseased individuals.

Cozaar Fails to Block Pressor Response in Cats

Vanessa Reynolds (with Sheerin Mathur, Su Sheldon, and Leslie Cartier)
Dr. Scott Brown, Department of Physiology and Pharmacology, University of Georgia

Systemic hypertension is a problem that occurs in one of five cats over the age of fifteen. Cozaar, a human antihypertensive drug, contains losartan, the active ingredient that serves as a competitive antagonist for the Angiotensin II type-1 (AT-1) receptor. By blocking this receptor, Angiotensin II (AII) mediated hypertensive effects such as vasoconstriction and increased blood volume are lessened – thereby decreasing blood pressure. We evaluated the efficacy of this competitive antagonist as an antihypertensive agent in cats. Angiotensin I (AI) is converted to AII in the body. In preliminary studies, we determined the optimum dosage of AI that produced a pressor response of an approximate 50 mmHg rise in systolic blood pressure. Subsequently, AI was delivered intravenously following varying dosages of Cozaar (0 mg, 5 mg, 10 mg, 50 mg, 75 mg, and 125 mg) to five cats implanted with radio telemetry blood pressure monitoring devices to determine if Cozaar could effectively block the pressor response. Conscious cats were dosed orally with Cozaar daily and then given a 1μg intravenous injection of AI four to six hours after dosing. In conscious, restrained cats given 0 mg of Cozaar, the AI injection resulted in an average 36.7 mmHg rise in systolic blood pressure. Cats dosed with 5 mg Cozaar and injected with AI averaged a 39 mmHg rise in blood pressure. Cats dosed at 10 mg, 50 mg, 75 mg, and 125 mg of Cozaar demonstrated a similar average increase in systolic blood pressure. The standard human daily dose of Cozaar is 50 mg. Even when the cats were dosed at 250% human dose and experienced the additive effect of high Cozaar dosages delivered on successive days, their baseline blood pressure and pressor response to AI administration did not significantly change. The results indicate that Cozaar does not hold potential as an antihypertensive treatment for felines. Future studies may determine why Cozaar / losartan is not metabolized by cats.

Amphibian Declines and the Frog Fungus Disease: Effects of Infection of Frog Eggs and Tadpoles

Tricia Rodriguez
Dr. Peter Daszak, Consortium for Conservation Medicine, Palisades, NY, Dr. Joyce Longcore, Department of Biology, University of Maine, and Dr. David Porter, Department of Botany, University of Georgia

Chytridiomycosis is a recently emerged fungal disease causing mass mortality and population declines in amphibians on a global scale. The disease is fatal to post-metamorphic frogs, although it does not cause mortality in tadpoles. Little else is known of its effect on these anuran larvae. The fungus infects only the keratinized mouthparts of tadpoles, but can result in the loss of a large proportion of their "teeth." Because tadpoles feed by scraping algae from a substrate with their teeth, tooth loss may inhibit their growth and development. I tested the hypothesis that infection with chytridiomycosis affects tadpole feeding abilities. I inoculated 25 *Rana pipiens* tadpoles with the fungal pathogen *Batrachochytrium dendrobatidis*; another 25 tadpoles served as controls. Tadpoles were weighed, measured and their developmental stage determined twice weekly. Growth parameters over five weeks showed no significant differences between infected and control groups. These data demonstrate that chytridiomycosis does not affect the feeding efficiency of tadpoles in early stages of development. Currently I am testing the role of amphibian eggs as a substrate for chytrid growth and means by which the disease increases its impact through different infection strategies. In addition, I am looking into possible mechanisms of disease transmission between life stages (vertical transmission) as well as infection from outside sources (horizontal transmission). These studies will aid our understanding of the ecology of this disease and help predict future patterns of disease outbreak.

Polar Endemism in Archaea: A Comparison of Archael 16S rDNA Sequences from the Arctic and Southern Oceans

Shomari Ruffin, CURO Apprentice
Dr. James T. Hollibaugh and Dr. Nasreen Bano, Department of Marine Sciences, University of Georgia

Cold polar oceans are relatively new features of the Earth, originating about 25 million years ago when the continents of Antarctica and Australia separated on the one hand, and the mid-Atlantic Ridge propagated into the Arctic Ocean basin, connecting it to the Atlantic Ocean. This was accompanied by a shift in global climate and both oceans cooled rapidly, forcing Arctic and Antarctic organisms to adapt independently to the new conditions. This led to the evolution of endemic species in the two oceans, for instance Polar Bears are endemic to the Arctic Ocean while penguins are endemic to the Southern Ocean. This study focuses on determining whether endemism applied to members of the Archaea Domain. To address this question we constructed a clone library of Archaea 16S rDNA sequences from five samples collected at a depth of 55m, 133m, and 235m during 1995, 96, 97 from the Central Artic Ocean. Each library was screened with denaturing gradient gel electrophoresis. The sequences of 25 clones with unique inserts were determined. All sequences were grouped within Euryarchaeota (Group II) and Crenarchaeota (Group I), the two major phylogenetic archeal groups. Within the Euryarchaeota there were two main clusters: one representing most of the 55m samples and the other was mostly composed of the deeper water samples. With a few exceptions, most of the sequences were distinct from southern ocean sequences. We concluded that polar Archael populations were composed primarily of endemic species. This study will provide information about the biogeography and biogeochemistry.

Cellular Tropism of an Undescribed Ehrlichia from White-Tailed Deer

Alexandra Isabel Sahora
Dr. William R. Davidson, Southeastern Cooperative Wildlife Disease Study (SCWDS),
Dr. Elizabeth W. Howerth, Department of Pathology, Dr. David E. Stallknecht, Department of Medical Microbiology and Parasitology, Vivien Dugan, Southeastern Cooperative Wildlife Disease Study (SCWDS), and Dr. Danny Mead, Southeastern Cooperative Wildlife Disease Study (SCWDS), University of Georgia

Prior studies on white-tailed deer have confirmed the presence of infection with at least three zoonotic *Ehrlichia* in the blood. An additional undescribed *Ehrlichia* was found to be common in white-tailed deer and the 16S DNA sequence of this organism was closest to *Ehrlichia platys*, a canine *Ehrlichia* that infects platelets. The objectives of this study were to visualize and determine the cellular tropism of this undescribed *Ehrlichia* agent. Antibody-coated magnetic beads were used to obtain high purity preparations of platelets free from other cellular components of blood, which were tested through polymerase chain reaction (PCR) and electron microscopy (EM) for ehrlichial infection. Blood from both naturally wild white-tailed deer and experimental wild deer was processed using two sets of Dynabeads® coated with either CD62P antibodies or M-M9 antibodies to obtain pure platelet and monocyte preparations, respectively. These preparations were then subjected to nested PCR using primers specific for this *Ehrlichia* and processed for transmission electron microscopy (TEM). PCR assays on platelet preparations consistently gave a strong, definite band correlating with the expected product size for this *Ehrlichia*. Positive PCR results were also produced for the monocyte preparations. Electron microscopy revealed characteristic *Ehrlichia*-like morula within platelets. These results strongly suggest that this undescribed *Ehrlichia* infects platelets. *In situ* hybridization assays to confirm the genetic identity of the morula in the platelets are in progress.

Children's Friendship Groups: The Wannabes in the Clique Hierarchy

Katrice Saudargas
Dr. Michele Lease, Department of Educational Psychology, University of Georgia

Friendship and peer acceptance are important for social development and self-esteem in children. According to the ethnographic research of Adler and Adler (1998), children's peer groups are organized along a continuum of popularity (i.e. visibility, social power, and control) into distinct groups including the popular clique, the wannabes, the middle group, and the social isolates. The "wannabes" were the focus of the current study. These children long to be friends with those in the popular clique but are denied inclusion. Adler and Adler (1998) describe the wannabes as being higher in popularity than the middle friendship children but having few, if any, friends. Adler and Adler (1998) hypothesize that due to a lack of secure friendships the wannabes have lower self-esteems and self-perceptions than those in the middle friendship groups despite their second highest ranking in the clique hierarchy. The current study tested this by comparing the number of best friend reciprocations of wannabes to those in other cliques as well as comparing scores on self-reported measures of self-esteem and self-perceptions. Participants were 222 students from four 4th, four 5th, and two 6th grade classrooms (51% female; 73% "white"/25% "black"). These children completed questionnaires in which they nominated peers for various descriptors and nominated three children who were their friends. The children also completed a range of self-report scales. A coding system was developed to classify children as belonging to the popular leader, popular, popular follower, wannabe, top middle friendship, middle friendship, bottom middle friendship, or social isolate level of the popularity hierarchy, as described in the ethnographic research reported by Adler and Adler (1998). The coding system used the following information: (a) perceived popularity (Parkhurst & Hopmeyer, 1998) and social preference (Coie et al, 1982) scores, (b) mutual friendship nominations as well as one-way nomination patterns, and (c) number of social influence nominations from peers (i.e., leadership, social control, admiration, and influence; Lease et al, in press). Interrater reliability was adequate (Kappa = .88). Because all children needed to be classified, all disagreements between the two coders were discussed and resolved. Children at the eight levels of the popularity hierarchy were compared on self-reported measures of loneliness and social dissatisfaction (Asher & Wheeler, 1985), social self-concept and self-esteem (Dubois et al, 1996), self-perception (Harter, 1985) and 3 BASC-SRP (Reynolds & Kamphaus, 1992) scales (i.e., social stress, interpersonal relations, and self-esteem). Preliminary findings show that wannabes do have fewer best friend reciprocations than those in middle friendship groups. Planned contrasts (wannabes vs. top middle friendship) revealed no significant differences in the self-report measures between these two groups, contrary to expectations.

New Balance Athens: "Endorsed by No One but Our Valued Customers"

Robin Seagraves
Dr. Michael Lomax, Department of Physical Education and Sports Studies, University of Georgia

The New Balance Athletic Shoe Corporation began a new retailing idea in 1996 with the opening of the first New Balance Concept Store. In an effort to increase distribution, the corporation began entering into agreements with local independent retailers, granting them the right to sell New Balance products exclusively. These stores are based on the concepts of "brand equity," the value added to a product by virtue of its name, and "brand loyalty," the ability of a particular brand to attract and retain customers, and they stock only New Balance footwear, apparel, and accessories. To date, there have been forty-one stores opened across North America. These stores have proved to be very profitable for both the retailer and the New Balance Corporation, with each store averaging between $600,000 and $800,000 in sales per year and showing an annual growth of approximately 40% (Wheeler, 2001). Therefore, it is my intention to capitalize on this market niche for the New Balance brand and open my own concept store, New Balance Athens. This paper will outline my proposal for the store's opening in four sections. First, the operations plan will provide a brief overview of the New Balance Corporation and will describe the basic interior and exterior set-up of the store, as well as the store location. Second, the marketing plan will identify the store's three target consumer groups. This section will also outline the store's first year marketing plan and budget. Third, the organizational plan will describe the managerial set-up and provide information regarding the tentative employee training program. Finally, the financial plan will analyze the total capital required for the store's opening.

Nitric Oxide Synthase mRNA Levels in *Trypanosoma cruzi* Infected iNOS Knockout and Wild Type Mice

Julie Seale
Kara L. Cummings and Dr. Rick Tarleton, Department of Cellular Biology and Center for Tropical and Emerging Global Diseases, University of Georgia

In vitro studies suggest that nitric oxide (NO) is an important killing mechanism of the intracellular pathogen *Trypanosoma cruzi*, the causative agent of human Chagas disease. Better understanding of the role of NO in immune control of *T. cruzi* has been obtained through the study of knockout mice lacking the enzyme nitric oxide synthase (NOS) needed for NO synthesis. Of the three NOS isoforms; inducible NOS (iNOS), endothelial NOS (eNOS) and neuronal NOS (nNOS), iNOS is thought to be most important for production of NO in response to pathogens. However, our lab has observed that wild type mice and mice with induced genetic defects in iNOS production (iNOS knockout mice) are equally resistant to *T. cruzi* infection. We hypothesize that mice lacking iNOS may compensate through higher production of eNOS and nNOS, explaining their resistance to *T. cruzi*. To address this question the levels of nNOS and eNOS mRNA in iNOS knockout mice infected with *T. cruzi* will be determined using a quantitative real-time PCR. The results will lead to a better understanding of the role of NOS in immune control of *T. cruzi*.

The Construction of the Lesbian Identity in the Undergraduate Classroom

Lotus Seeley
Dr. Bonnie Dow, Women's Studies, University of Georgia

As the gay and lesbian rights movement has worked to increase the civil rights of sexual minorities, within the academy there has been a parallel rise of the field of gay and lesbian studies, which has sought to understand and theorize the experience of sexual minorities. Some researchers have concerned themselves with the experience of sexual minorities in schools, predominantly heteronormative institutions. Little attention, however, has been paid to the experiences of undergraduate sexual minorities. My project is concerned with elucidating the classroom experiences of undergraduate lesbians. Specifically, I focus on how women's construction and performance of a recognizable lesbian identity is constrained by how comfortable they feel in disclosing their sexual identity with in a classroom setting. Special attention is paid to the multiple ways, including more and less overt verbal statements and nonverbal means, women attempt to communicate their sexual identity to other individuals in the classroom. Variables such as class size, subject matter, discipline, gender/sexuality of the teacher, and class level are also examined to understand how each may constrain or permit disclosure in their own way. The data for this project comes from open-ended interviews conducted with twenty-two undergraduate women at the University of Georgia who self-identify as lesbian. The women are aged 18-24 and 28.5% of the sample are minorities. Hopefully, the knowledge gained from this project will serve to better the experiences of sexual minorities by allowing a greater understanding of the factors that allow individuals the greatest control in revelation of sexual identity.

Immunohistochemical Detection of Newcastle Disease Virus in Chickens Inoculated with Wild-Type and Infectious-Clone-Derived Newcastle Disease Virus

Amy Sexauer,
Daniel J. King, Bruce Seal, Dr. James Stanton, and Dr. Corrie Brown, Department of Pathology, University of Georgia

The U.S. poultry industry is a thriving economic entity, thanks in part to the exclusion of devastating diseases. Velogenic Newcastle disease is a viral problem causing significant mortality for chickens. The Newcastle disease virus (NDV) circulates in many parts of the world, and incursion into the U.S. would have serious consequences. Understanding what makes these velogenic strains of Newcastle disease virulent would help greatly in devising control methodologies. In this study, four groups of White Leghorn chickens (eight per group) were inoculated with four different viruses – E13-1 (nonpathogenic strain), NDFL+ (infectious clone made from E13-1), NDFL+F (NDFL with fusion virulence gene inserted), and KRC 139 (virulent strain). The birds were monitored clinically and two birds euthanized, with tissues collected at two, five, 10, and 14 days post infection (dpi). Those given the virulent strain succumbed rapidly, dying by 4 dpi. Mild depression was noted in the NDFL+ group. Immunohistochemistry, using an antibody specific for NDV, was employed to follow the path of the virus throughout the body. With the virulent KRC 139 strain, there was extensive viral replication throughout the body. With the other three strains, presence of the virus was very limited. The "F" gene may not play a big role in virulence.

Induction of Apoptosis by Rabies Virus Proteins

Parul Shah
Dr. Zhen F. Fu, Department of Pathology, University of Georgia

Although rabies is one of the oldest recorded infections, it still causes more than 70,000 human deaths each year. The mechanisms by which rabies virus infection causes diseases and death are not completely understood, particularly with regard to the scarcity of neuronal damage associated with rabies virus infection. Recently, apoptosis was reported in experimentally infected animals. To further investigate if apoptosis is a pathogenic mechanism for rabies, we have compared the induction of apoptosis in animals infected with different rabies virus. Groups (10) of mice were infected with 10^6 focus-forming unit (ffu) of either laboratory-adapted or wild type rabies virus. Brains from four mice in each group were used histopathology, and brains from other mice were used for detection of apoptosis using terminal deoxynucleotidyl transferase-mediated dUTP-digoxigenin nick end-labeling (TENEL) assay. Surprisingly, only laboratory-adapted virus induced apoptosis in the brains of infected animals whereas the wild type rabies virus did not, indicating that apoptosis may not be a pathogenic mechanism for rabies, particularly for wild type rabies virus infections. To further investigate the mechanism by which rabies virus infection induces apoptosis, we expressed rabies virus nucleoprotein (N), phosphoprotein (P), and glycoprotein (G) proteins from laboratory-adapted virus individually in insect cells via recombinant baculoviruses and monitored for the induction of apoptosis in insect cells by DNA laddering. Preliminary studies revealed that apoptosis is induced only in cells infected with recombinant baculovirus expressing rabies virus G, indicating that rabies virus G is capable of inducing apoptosis.

Purification of Hirano Bodies from *Dictyostelium discoideum*

Sonbol Alexandria Shahid-Salles
Dr. Marcus Fechheimer and Dr. Ruth Furukawa, Department of Cellular Biology, University of Georgia

During the past three decades, Hirano bodies have been described in post mortem examination of brain tissue from patients with neurodegenerative diseases, muscle diseases, diabetes, alcoholism, and cancer. The Hirano body is composed of highly ordered paracrystalline actin filaments, actin binding proteins, and other components that have not been definitively elucidated. Recent studies demonstrate that Hirano bodies similar to those described in humans can form in the model organism *Dictyostelium discoideum.* The goal of this project is the biochemical purification of Hirano bodies to define their primary constituents. First, an assay to detect the presence and stability of Hirano bodies was developed using fluorescence microscopy. Second, it was found that Hirano bodies were stabilized in solutions containing 5 mM EGTA, 1 mM $MgCl_2$, 1 mM ATP, at pH 6.5 at room temperature. Third, release of intact Hirano bodies was observed to be optimal with lysis of *Dictyostelium* cells by Dounce homogenization in the presence of 0.5% Brij detergent. Fourth, Hirano bodies were collected by low speed sedimentation following cell lysis, and further enriched by density gradient fractionation in step gradients of iodixanol to remove nuclei. Protein separation by two dimensional gel electrophoresis with subsequent identification utilizing mass spectroscopy will be performed to identify the primary constituents of Hirano bodies. Future studies will also assess the role of these proteins in the formation of Hirano bodies by creating *Dictyostelium* cells lacking specific components. In addition, the presence of these proteins in Hirano bodies in autopsy specimens will be assessed.

Developing a Sensor for Measuring Suspended-Sediment Concentrations

Jai Sikes
Dr. Bruce L. Upchurch, Department of Biological and Agricultural Engineering, University of Georgia

Stream sediment degrades water supplies for human use, acts as a carrier for pollutants, and may adversely affect fluvial ecosystems. Recently, a densimetric instrument or "densimeter" for *in situ* monitoring of suspended sediments was developed. This densimeter offers advantages over commonly used samplers by continuously measuring suspended-sediment concentrations on site and allowing for longer sampling periods. Laboratory tests provided accurate results for concentrations from 10mg/L to 1000mg/L; however, field measurements contained several artifacts in the output signal. There was a ±30mV ($0.0024 in H_20$) fluctuation in the output signal when the transducer was placed in the field that corresponded to an 88mg/L (8.8% error F.S.) change in sediment concentration. Variations in the measurement could be caused by noise or dynamics of fluid flow around the ports. The objective of this project was to investigate the effects of port vibrations on the pressure measurements. A scaled version of the densimeter was constructed and tested by mounting a differential pressure transducer to an inverted pendulum and inducing vibration through a rotating cam. During three repetitions, differential pressure changes were monitored for a vibration range of 2-6 Hz and displacement angle range of 0.52-4.2 degrees in standing water. Generally, the differential pressure increased as displacement and frequency increased. A linear offset in the data was observed and contributed to a 50%-300% error; however, after subtracting the offsets, the results closely tracked the theoretical model. Further study will use these initial findings to develop an accurate measuring protocol for application of the densimeter in the field.

Immunohistochemical (IHC) Detection of Natural Killer Cells in Fish

Kate Smith, CURO Summer Research Fellow
Dr. Kenneth S. Latimer, Department of Pathology, University of Georgia

Immunohistochemistry (IHC) is the use of antibodies to detect specific antigens in cells of various tissues and organs. Sections of paraffin embedded tissues are cut at 3µm thickness and placed on glass slides. Following dewaxing, application of the IHC technique, and appropriate counterstaining, specific cells can be identified microscopically based upon their surface antigen expression. In this study, an IgM primary monoclonal antibody was used to identify natural killer (NK) cells in tissues of black sea bass (*Centropristis striata*). The specific IHC procedure was the avidin-biotin immunoperoxidase complex method. Sites of primary IgM antibody binding were identified using a biotinylated secondary antibody, an avidin-biotin peroxidase complex, and a diaminobenzidine chromagen. The slides subsequently were counterstained with hematoxylin, dehydrated, coverslipped, and examined microscopically. Natural killer cells are critical for effective innate and adaptive immunity in teleost fishes. The purpose of this study was to develop the IHC procedure to detect natural killer (NK) cells in formalin-fixed, paraffin embedded tissue sections from black sea bass, an important marine fish species along the Georgia Atlantic Coast. The significance of this initial research accomplishment is that the IHC staining protocol that was developed developed can now be applied to investigations of specific facets of cell-mediated immunity in fish. The technique will be used to investigate NK cell populations in histologic sections of lymphoreticular tissues from clinically normal black sea bass to understand the dynamics of this cell population in the constitution of the cell-mediated immune system. Expectations are that this technique will be used to expand basic knowledge of an important facet of immunity in black sea bass and other telost fishes. The information obtained will be useful in evaluating the health status of cultured black sea bass stocks before costly mortality events occur.

Optimization of Textural and Structural Properties of a Refrigerated Soy Based Dessert

Sara Smith, CURO Apprentice
Dr. Milena Corredig, Department of Food Science and Technology, University of Georgia

Soybeans have been used for many years in the production of soybean products and soy enriched products. In recent years scientist have found more nutritional value in the soybean. Due to these new discoveries industries have begun to increase the amount of and invent new soybean or soy-enriched products. Products ranging from soymilk to soy-enriched cereal have flooded the health food market. With the U.S. focusing more on health issues a demand for new soy products is growing. The objective of this project was to develop a sugar free soy based refrigerated dessert with the texture, taste, and feel of a mousse- type product. The texture was fundamental to the quality and the challenge is to maintain the textures at refrigeration temperatures. Grittiness was a characteristic typical of soy-based products. These textual properties were the focus of the formulation development. These textual properties derive mainly by fat globules, ice crystals, and air bubbles all in a protein network. All of these in an optimal equilibrium will result in acceptable physiochemical and organoleptic qualities. Preliminary work on a small scale (1 kg batches) and then larger batches (2 kg batches) were prepared in the pilot plant. Each of the eleven batches were characterized by a different formulation and were prepared by mixing, pasteurization, homogenization, freezing, and refrigeration. Formulations were optimized in the pilot plant and the best combinations were tested for texture and the microstructure was observed. Texture was tested with the TA-XT2 texture analyzer. The effect of various concentrations of soy protein and the ratio of soy to milk protein (used because of its functional properties) was studied. If starch was added to the formulation the texture was highly creamy but not stable enough to hold its structure in refrigerated temperatures and therefore not acceptable. The addition of soy protein strengthened the texture and stability but added to its grittiness. The grittiness increased when the amount of soy protein increased. To improve stability at refrigeration temperatures a stabilizer was added. Two types of stabilizers were tested. Stabilizer one contained gelatin (Degussa) and the other did not contain gelatin (Cpkelco). The gelatin-containing stabilizer was used successfully in many different formulations and resulted in acceptable texture. The non-gelatin stabilizer was successful in only a few formulations.

The Effect of Light Intensity on the Transformation Frequency of Soybean Somatic Embryos

Lauren Stanchek
Dr. Wayne Parrott, Department of Crop and Soil Sciences, University of Georgia

The effects of light intensity on the embryogenesis of numerous plant species have been well-characterized. However, the effects of varied light intensities on the transformation frequency of embryos have been largely unexplored. This experiment sought to determine the influence of light intensity on the frequency and efficiency of soybean somatic embryo transformation. Embryos were generated from immature cotyledons under either high light [46 $\mu E/m^2$ /s] or low light [10 $\mu E/m^2/s$] and bombarded with the pCAMBIA 1305.2 construct, which contains two genes—one that confers resistance to the antibiotic hygromycin and the other the GUS Plus reporter gene. Both treatments consisted of four replicates of approximately 100 mg of tissue/replicate. After bombardment all embryos were placed into liquid 25 μg/ml hygromycin selection for two months. The resultant hygromycin resistant embryos were tested for expression of the GUS Plus gene. PCR was performed to determine the presence of the hygromycin resistance gene and to exclude the possibility of "escapes." Stable transformants and copy number of the lines were assessed by Southern blot hybridization analysis. The total transformation frequency, based on hygromycin positive PCR results, was 5 lines/bombardment for the low light treatment and 1.1 lines/bombardment for the high light treatment. Therefore embryos grown under the low light treatment appear to be more amenable to transformation than those generated under high light. The expression transformation frequency was based on the expression of the GUS Plus reporter gene. In general the expression transformation frequency was approximately half of the total transformation frequency for both treatments. Student's t-test showed the results to be significant at the one percent level.

Friendship in the Age of Sensitivity: The Correspondence between Johann Wilhelm Ludwig Gleim and Johann Georg Jacobi

John Stark
Dr. Mark Kagel, Department of Germanic and Slavic Languages, University of Georgia

Sensitivity, or *Empfindsamkeit* in German, is a term that refers to a period of the German Enlightenment and is characterized by the frequent and often excessive expression of emotion. Sensitivity writing often examines the relationship between the head and heart as well as those things that disrupt this balance, such as enthusiasm and melancholy. Letter writing as a medium for communicating emotions is an integral part of the literary writing during the Age of Sensitivity. The letters help to establish a community of minds, serving not only as a medium between friends, but also as a form of introspection, by which writers could better discover themselves. An examination of an extended correspondence between Johann Wilhelm Ludwig Gleim and Johann Georg Jacobi, published in 1768, offers insight into the fashion of the period: to express oneself emotionally and not to veil or rationalize one's feelings. It also shows how friendship is established and expressed between two educated men in the middle of the eighteenth century. The language of the correspondence shows that Gleim and Jacobi prefer a language of emotion to a language of reason in their friendship correspondences with one another. Gleim and Jacobi's correspondence reflects the deep labyrinth-like intricacies of their complex friendship. The correspondence between Gleim and Jacobi reflects the feelings of many members in the educated population of Germany during the period of Sensitivity.

Time and Myth: Literary/Philosophical Accounts/Representations

Joshua Striker
Dr. Thomas Cerbu, Department of Comparative Literature, University of Georgia

In the research paper, "Time and Myth: Literary/Philosophical Accounts/Representations", I investigate the anthropological significance of time and myth within, broadly speaking, the contexts of philosophy as well as of literature. Concentrating primarily on Frank Kermode's *The Sense of an Ending*, Jean-Paul Sartre's *Nausea*, and Robert Musil's *The Man Without Qualities*, the essay also discusses Augustine's definition of time, the way in which Paul Ricoeur understands the relationship between literature and the self's temporality, and Michel Tournier's mythical, timeless Abel Tiffauges. While to some degree a work connected inextricably to particular texts, this paper attempts as well to summarize and consolidate the fundamental, or perennial, aspects of those texts' theses in order to present a relatively independent construal of myth and time. Balancing delicately basic categories like philosophy and literature, time and myth, the essay follows the lead of many of its textual foci in retaining categorical distinctions without indiscriminately accepting their accuracy. In this vein, the essay will explore those ontological and epistemological commitments that myth-making entails, such as the commitment to personhood, or interpersonal communication, as well as the communicative form(s) and presentations of the self that mythologizing contains. Ultimately, "Time and Myth: Literary/Philosophical Accounts/Representations" construes myth as an extreme form of man's endeavor to explain and portray himself within time.

Biometric Differences between Otoliths of Two Species of Sea Catfish

Kathleen Teeples
Dr. Elizabeth Reitz, Georgia Museum of Natural History, University of Georgia

This study defined differences between the otoliths of two species of sea catfish using biometric analyses. Vertebrate remains from archaeological sites are identified using a comparative skeletal collection. The results are interpreted in terms of human/environmental relationships. Otoliths, the inner ear stones of fish, are commonly found in coastal assemblages dominated by sharks, rays, and bony fishes. The morphology of these skeletal elements are species-specific. However, it is difficult to distinguish between two species in the family Ariidae (sea catfishes) based solely on otolith morphology. Distinguishing between the hardhead catfish *(Arius felis)* and the gafftopsail catfish *(Bagre marinus)* is critical to a broad range of zooarchaeological research problems, especially those based on habitat differences, such as stable isotope analysis. Members of these two genera once grew to a much larger size, and stable isotopes may identify the causes for this, but first we must be able to distinguish between the otoliths of the two species. The length, width, and thickness of 80 otoliths from the two species were measured and mathematical equations applied to define differences between them. These otoliths were from the comparative collection at the zooarchaeologicallab, Georgia Museum of Natural History. The results of this study are significantly different from those of previous studies whose results could not be duplicated. Stable isotope protocols will be adjusted to take the difficulty of distinguishing between these species into account.

Parameter Development and Application of the Glycam Force Field for Sialic Acid Derivatives

Buudoan V. Tran, CURO Summer Research Fellow
Dr. Karl N. Kirschner and Dr. Robert J. Woods, Complex Carbohydrate Research Center, University of Georgia

Glycerol and glycerol derivatives are ubiquitous in biological systems, from fatty acids to polysaccharides. Understanding the interplay of intra- and inter-molecular forces in glycerol and the effect these forces have on the conformation is critical in understanding the role and behavior of compounds that contain glycerol. Molecular modeling systems can provide valuable insight into the behavior of complicated systems. The GLYCAM parameters for molecular mechanics (MM) and dynamics simulations of carbohydrates with the AMBER force field have been extended to include parameters for acyclic polyhydroxy compounds. The parameters were developed for 1,2-ethanediol using quantum mechanical (QM) calculations of its potential energy using HF/6-31 G* and B3LYP/6-31++G(2d,2p) levels of theory in the Gaussian98 program suite. The conformational energies for the various rotamer populations of 1,2-ethanediol were compared to energies given by MM calculations in the GLYCAM force field, yielding parameters for the OCCO torsion angle based on an analysis of the effect of non-bonded interactions. Once parameterized, the QM and MM results were in good agreement. These parameters are particularly relevant for simulations of sialic acids, which contain glycerol sidechains. The behavior of these sidechains and, consequently, the conformation of sialic acid depend directly on the influence of the OCCO torsion system. Molecular dynamics simulations were performed on 5-N-acetylneuraminic acid and glycerol and the results compared to solution-phase NMR data. The computed solution structures and rotamer populations are in good agreement with the experimental data. The conformational properties are discussed in terms of internal hydrogen bonding versus solute-solvent interactions.

The Use of Immunohistochemistry to Diagnose Chytridiomycosis in Frogs

Tracy K. Van Ells
Dr. Corrie Brown, Department of Pathology, University of Georgia

Chytridiomycosis, caused by *Batrochochytrium dendrobatidis*, is an emerging disease of frogs, posing a threat to their survival in many parts of the world. Because the disease can be difficult to diagnose on routine pathologic sections, the purpose of this study was to develop a standardized method for identification. To accomplish this, immunohistochemical staining was applied to histologic skin sections from four experimentally infected frogs of the species *Dendrobates tinctorius*. The primary antibody was anti-chytrid, made in rabbit, followed by biotinylated anti-rabbit, made in goat. The detection system was avidin-biotin alkaline phosphatase and the substrate used was Vector Red. Antibody dilutions were titrated to optimize the signal. A dilution factor of 1:2500 for the primary antibody was found to maximize visualization of the fungus while producing very little background staining. Negative serum and tissue samples were also included, as were four non-chytrid fungal controls, to ensure the specificity of the primary antibody. Staining of the positive tissue sections was distinct and readily visualized, making this technique a valuable ancillary diagnostic test for the presence of this important disease.

The Genomic Study of Multigene Families of *Pneumocystis carinii* for Potential Drug Targets

Claudia Vargas
Dr. Jonathan Arnold, Department of Genetics, University of Georgia

Pneumocystis, a genus of opportunistic fungi, is a serious threat to immune deficient patients, particularly those who are HIV positive. *Pneumocystis* causes thousands of deaths each year by infecting the lungs of immunocompromised individuals, leading to acute pneumonia. An estimated eighty-five percent of patients diagnosed with AIDS will develop pneumonia caused by *Pneumocystis*. Efforts to expand therapeutic options against this pathogen are essential, as increased use of antibiotics has lead to drug resistant fungal strains. Due to the obligate parasitic nature of *Pneumocystis*, it has been difficult to traditionally culture and study this organism; thus, genomic methods have been utilized to produce the most informative research. This multi-institutional research project among the University of Cincinnati College of Medicine, University of Kentucky, Indiana University Medical School, and University of Georgia aims to produce a genomic map of *Pneumocystis carinii f. sp. carinii*. Several genetic methods have been employed including generation of multiple *Pneumocystis* libraries, sequencing through subcloning of related contig DNA, and hybridization by P-dCTP pWEB DNAs against a known *Pneumocystis* cDNA library. Presently, over fifty percent of the genome map has been constructed with an average of thirteen contigs per chromosome. Several significant protein-coding sequences were identified, such as the major surface glycoprotein family (MSG), which is hypothesized to be responsible for the pathogenic nature of *Pneumocystis*. Other findings include the discovery of only a single copy of rDNA in *Pneumocystis*, which is a possible genome conservation strategy.

Joan of Arc: History's Conflicted Warrior

Karen Viars
Dr. Katharina Wilson, Department of Comparative Literature, University of Georgia

Since before her death in 1431, Joan of Arc has been a fascinating subject for writers. The first of these was Christine de Pizan in 1429 and they continue into the present day. Each author, while usually expressing great respect for Joan and her accomplishments, almost always uses her as a historical example to influence contemporary politics. Because Joan was a political figure inextricably part of France's role in the Hundred Years War, it is not surprising that authors and propagandists use her in this way. Politics is not the only arena in which Joan's story appears as a didactic tale; portrayals of her vary as widely as the causes writers cite her to support. These different and often conflicting images have much to do with Joan's rehabilitation trial and canonization as a saint in 1920, with her usefulness as a propaganda figure, and with modern ideas of her nature. Using various texts spanning from the original trial documents to modern works, I intend to assess images of Joan of Arc in literature and culture, and discern how authors use her as an icon to further their own agendas.

Cytoskeleton Induced Apoptosis of HeLa Cells

Heidi Woessner
Rich Davis, Dr. Ruth Furukawa, and Dr. Marcus Fechheimer, Department of Cellular Biology, University of Georgia

Cells die from diverse processes such as senescence (old age), necrosis (disease), and apoptosis (programmed cell death). Apoptosis is characterized by a series of cellular events including activation of caspases, mitochondrial membrane depolarization, blebbing at the plasma membrane, and fragmentation of DNA in the nucleus. Apoptosis occurs in association with a variety of normal and pathological conditions. The initial goal of this project was to study formation of Hirano bodies in HeLa cells, an immortalized epithelial cell line, following expression of an altered form of the *Dictyostelium discoideum* 34 kDa actin bundling protein. Hirano bodies are paracrystalline actin structures associated with a variety of diseases. Formation of Hirano bodies in HeLa cells was not observed. Surprisingly, HeLa cells were stimulated to undergo apoptosis. The following evidence supports this conclusion: 1) an increase in cell death was observed by staining the cells with trypan blue; 2) membrane blebbing was detected by light and scanning electron microscopy; 3) DNA fragmentation was demonstrated using a TUNEL assay that detects free ends on DNA; and 4) loss of energized mitochondria was demonstrated using a fluorescence assay. These findings were unexpected, since the actin cytoskeleton in not known to participate in initiation of apoptotic signaling. Future studies will attempt to unravel the pathways of apoptosis initiated by perturbation of the actin cytoskeleton. Moreover, additional investigation is needed to elucidate the relationship between formation of Hirano bodies and initiation of apoptosis in different cell types.

The Generation of Mutations in the N-Terminal Region of the Protoporphyrinogen Oxidase of *Bacillus subtilis* to Create a Protein Capable of Mitochondrial Targeting in Mammalian Cells

John Woodruff, CURO Summer Research Fellow
Dr. Harry Dailey, Department of Microbiology, University of Georgia

Protoporphyrinogen oxidase (E.C.1.3.3.4) (PPO) is the penultimate enzyme of the heme biosynthesis pathway. Given the mitochondrial location of both its substrate and the subsequent enzyme of the eukaryotic heme biosynthesis pathway, PPO must be effectively targeted to the mitochondria to function properly. Human PPO contains a N-terminal mitochondrial targeting sequence that is atypical in a number of its characteristics, including the fact that this leader is not cleaved following its import into mitochondria. This is significant because the leader sequence is also involved in PPO functionality. Because the leader is required for PPO to function, it has been highly conserved throughout evolution, and a homologous region occurs in the PPO of *Bacillus subtilis*. The current study demonstrates that the prokaryotic *B. subtilis* leader does not target Green Fluorescent Protein (GFP) fusions to the mitochondria of hepatoma cells. It is shown that it is possible to introduce mutations to the *B. subtilis* leader that confer certain putative characteristics of the human PPO N-terminal targeting sequence, including its hydrophobic-hydrophilic amphiphilic alpha helix with a basic region at its far end, transforming it into a leader that induces translocation. In doing so, this study has identified the characteristics of the N-terminal region of PPO that are responsible for its ability to function as a leader sequence.

The Effect of Genetic Background on Stress Resistance in Transgenic Fruit Flies
Amber Wright
Dr. Daniel Promislow, Department of Genetics, University of Georgia

Attempts to identify genes that extend life span in fruit flies have used short-lived lab strains. We hypothesize that these 'longevity' genes may simply cure short-lived flies. The experiment described below attempts to determine if longevity genes also increase fitness in longer-lived wild-caught flies. Previous research has demonstrated that resistance to oxidative stress plays an important role in the aging process. Antioxidant genes such as superoxide dismutase (SOD) fight aging scavenging free radicals. In the fruit fly, *Drosophila melanogaster*, mutants that over-express SOD live substantially longer than control flies. Unfortunately, these mutants, and others like them, are produced by inserting novel genes into relatively short-lived laboratory strains. To determine whether SOD can extend life span in natural genetic backgrounds, we crossed SOD males with strains of fruit fly recently derived from wild populations. Previous studies have shown that longevity is genetically correlated with stress resistance. Accordingly, offspring from each SOD x wild line cross were tested for resistance to the paraquat, which generates oxygen radicals, and to a 38° C heat shock, which denatures proteins and increases mortality rates. We found that over-expression of SOD generally increased stress resistance, though in some genotypes SOD had no effect, or even decreased stress resistance. These results indicate that while mutant genes identified in the lab might be important in natural populations, not all genotypes will respond to such genetic manipulations. Future studies will attempt to identify specific genes that interact with SOD to modify its effect on longevity.

Isolation and Characterization of Novel Anaerobic Thermophilic Iron(III)-Reducing Bacteria
Eric Wright, CURO Apprentice
Dr. Juergen Wiegel, Department of Microbiology, University of Georgia

This research focused on discovering and studying novel species of anaerobic, thermophilic, iron(III)-reducing bacteria from volcanic areas and hot springs in Russia and the United States. Iron-reducing bacteria are important to several geochemical processes around the globe. Isolation of the bacteria involved anaerobic techniques using sophisticated gassing equipment and atmospheric controls to produce pure, single-species colonies in media incubated under high temperatures. Two samples were used in the isolation process and were transferred to cultures containing differing media and concentrations of gases. From there, single strains were isolated. Characterization of the isolated specimens will be accomplished through RNA sequencing. Since anaerobic, thermophilic iron-reducers survive under conditions similar to those of the early earth, the study of these bacteria will shed light on the biological and chemical processes and pathways that were probably present in early unicellular life, and perhaps on the evolutionary process itself.

Adintern.com: A Website to Assist Advertising Focused Students in Finding, Getting, Keeping, and Leaving an Internship
Margaret Young
Dr. Kirsten L. Strausbaugh, Department of Advertising/Public Relations, University of Georgia

Adintern.com is a website to assist advertising & design focused students in finding, getting, keeping, and leaving an internship. Adintern is a practical application of research while at the same time a new medium to fill a niche in the online and career services arena that has in the past been overlooked in the field of advertising. Internships are a vital part of the advertising curriculum and are an essential prerequisite to an entry-level position in the competitive field of advertising. Advertising agencies do not recruit like many business corporations; it is therefore upon the advertising students to create opportunity. Adintern creates this opportunity. The site consists of various facets helpful to the advertising student, the main of which are advertising focused career advice, advertising industry information and trends, agency profiles, internship postings, advice from advertising experts, access to previous interns for advice, and links to industry publications and relevant information. Aside from the site itself, the written thesis examines the motivations and reasoning behind the site, influences of the site, methods used to prepare the site, and a formative evaluation of the site's design and usability. Adintern.com is proactive, prolific, and progressive. The site is viewable from the World Wide Web at http://www.adintern.com.

Artist Statements
Visual Arts
Creative Writing

Stephanie Anderson
Professor Edward Lambert, Fabric Design, Lamar Dodd School of Art, University of Georgia

"The body is not a thing; it is a situation." – Simone De Beauvoir
In this body of work the subjects are the keys. They are first but not primary. Their forms are constructed only of shadows yet they embody their surroundings. The shadows act as boundaries in a state of flux as there are no true borders beyond one's own construction. My interest is in the relationship between the subject and its environment. Does the environment act upon the individual or is it the individual's perspective which shapes their surroundings? Which shapes their surroundings? These works allow insight into the mutability of perspective. The subjects are not symbols but are symptoms of the intermixing of place and sensation. Color is that language by which the situations are told. Transparent pigments are applied in layers on loose woven linen to build perceptual depth of hue. The additive process allows many colors to be present at once within each area.

Antibiotic Art
Jeff Edwards
Professor Robert Stackhouse, Lamar Dodd Professorial Chair, Lamar Dodd School of Art, University of Georgia

I am not a troublemaker, I swear! My recent sculpture has been about creating staged social conflict within the viewer. My goal is to allow the viewer to interpret her or his reaction as psycho-visual incongruities in her or his social thought. Each piece is designed to create emotional action or reaction. Over time, I hope to develop a catalog of human emotional experience, with each sculpture cataloging the greater metaphors of existence. I wish to inspire dialog about creating experience-based social change. Being a professional artist is one of the most self-glorifying careers one could choose. It stands to reason that an artist should cultivate her or his true understanding of the self. "One is never more attractive than when one is being one's true self." Note to self – Rent costume! Never should it be said that an artist "does not know what her or his work means." Neither should it be said that the artist created a work "for no reason." Wasting opportunity makes your work not worth a footnote. The artist has the responsibility to defend and promote her or his work. Talking about projects is an opportunity – a platform. This movement will likely be bisected by a hypocrite movement with "similar principals," likely from advertising or insurance interests, unless YOU, as artists defend, promote, and explain your work. Ancient Egyptians used pictures to represent words. Modern Americans use words to create pictures, metaphors. My art uses visual metaphors to create emotion.

Caitlin Martell
Professor Melissa Harshman, Printmaking, Lamar Dodd School of Art, University of Georgia

My current body of work stems from an exploration of the beauty of repetition and the language of the body. Working in an unmediated and ritualistic method, I make prints of my body, building up the surface through repetition, documenting the texture and markmaking of my own skin. I seek to visually communicate the experience of the soul by developing a language through the repetition of my own bodily forms. The work is both simple in execution and yet visceral. It draws from the influence of artists such as Kiki Smith and Leslie Dill as well as more direct studio exposure to the etchings of Jennifer Anderson.

Amanda Gary
Professor Edward Lambert, Fabric Design, Lamar Dodd School of Art, University of Georgia

Utilizing the designs of primitive artists as a point of departure, my work revolves around the simple, contemporary processes that reflect a combination of primal and modern sensibilities. Creating layer fabric allows for the exploration of shape, color, and line in a very direct and innovative manner. From simplistic design and technique, I attempt to show complex and multi-layered images with fabric.

"each morning I get up with one word in mind: plastik…"
Lorina Naci, CURO Summer Research Fellow
Professor William Paul, Jr. Drawing and Painting, Lamar Dodd School of Art, University of Georgia

My artistic work is concerned with two encroaching phenomena that address the legitimacy of my Albanian heritage: Post Communism and globalization. I am interested in the quintessential values of Albanian natives and how some of these values are threatened by the advent of better technologies, faster information flow, and faster lifestyles brought by globalization in my country as well as elsewhere in the world.

By focusing on facial close-ups and on the physiognomy of natives of Albania and of Western Europeans in painting, in film, and in sculptural work, I seek to investigate the identities produced by the different economical, political, and social systems expressed visually in the body as the physical site of the human interaction with the governing system.

Theresa Marie Sporer
Professor Larry Millard, Sculpture, Lamar Dodd School of Art, University of Georgia

Using a dichotomy of materials, my sculptures express experiences from my life. I am really attracted to the interaction of contrasting materials (such as fibers, steel, and ceramics) inter-laced and working together to create an overall mood. I incorporate my ceramics background into my sculpture by utilizing techniques from both disciplines. The endless capabilities of sculpture enable me to develop themes in my work, which I was unable to accomplish with just ceramics. Reoccurring themes in my work include marriage, anticipation of becoming pregnant, and the trauma I experienced after being bitten by a venomous snake. These ideas and experiences are expressed conceptually rather than through direct imagery.

Jennifer Srygley
Professor Judson Mitcham, Department of English, University of Georgia

In writing poetry for my Honor's thesis this semester, I am exploring the effect of sounds and rhythm on the writing of the lyric. Perhaps this exploration can best be explained in the words of poet Richard Hugo, "all truth must conform to music." My thesis is comprised of a collection of poems written in various workshops. In writing poetry, I have found that it is impossible to completely separate my work from the rich tradition of American poetry. Poets whose work has influenced my own include Frank O'Hara, Richard Hugo, Kenneth Koch and Ellen Bryant Voight. If one thinks about poetry as a kind of music, it is possible to gain a new level of understanding of poems that is based on aural expression and often belies the content of the words. In writing and reading my poems, I hope that I am able to convey a sense of sounds and the musical quality of language.

Index of Faculty and Students

T

U

V

W

Y

Z

2004 Abstracts

By Author
By Title

By Author: A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Switch to Search By Title

A

Maureen Abbott

Kaveh Aghaie

Cara Altimus

Prashant Amin

Nader Amir

Chantelle Anfuso

Tony Anfuso

Ryan K. Armstrong

B

Wendy Ballew

Robert Brady

Mary Elizabeth Brice

Denise Brinson

Josef Broder

C

Melissa Cabinian

Martha Rose Calamaras

Lauren Cantwell

Nicholas Capito

Cameron F. Cavola

Krisda Chaiyachati-1

Krisda Chaiyachati-2

E

F

G

H

I

J

K

L

M

Abstracts

Maureen Abbott
Are Deer Mice the Reservoir of Vesicular Stomatitis Virus?

Despite extensive research efforts to clarify the transmission cycle of vesicular stomatitis virus (VSV), the causative agent of an important arboviral disease of livestock in the western United States, several aspects remain unclear, including the involvement of insects in virus transmission. Experimental infections of natural livestock hosts with the New Jersey serotype (VSV-NJ) have failed to produce sustainable viremia. In studies with deer mice (Peromyscus maniculatus), juvenile deer mice developed viremia following intranasal and intradermal VSV-NJ inoculation. However, it was not determined if the level of viremia was sufficient to infect insects. The objectives of this project are to determine if viremia is present in juvenile deer mice after being fed upon by black flies infected with VSV-NJ, and to determine if black flies can be infected with VSV-NJ by

feeding on viremic deer mice.

Laboratory-reared female black flies (Simulium vittatum) were infected with VSV-NJ by intrathoracic inoculation and allowed to feed on susceptible juvenile deer mice. On post-infection day 3, blood samples were collected from each mouse and tested for presence of VSV-NJ by cell culture inoculation. Additionally, non-infected black flies were fed on mice at the same time period. Viremia had not been detected in any of the mice as of day 6. As of day 7, 4 of 15 mice developed severe posterior paralysis, indicating transmission of VSV-NJ through fly bite. Transmission in the remaining mice will be confirmed by virus isolation from brain samples and serum neutralization assay.

Back to Authors
Back to Titles

Kaveh Aghaie
Zoroastrian Influences on Abrahamic Religions

When people from varying geographic regions interact with one another, certain characteristics cross borders. These characteristics can come in the form of different ideas based on religious beliefs. As these beliefs cross borders, they may be more directly based on cultural characteristics instead of religious principles. One may not realize that a belief that they thought originated with their religion actually originated with another. Within the Abrahamic religions of Judaism, Christianity, and Islam there are specific there are specific religious principles that are viewed to have originated from within, when actually they originated elsewhere. The followers of the Abrahamic religions have come into contact with people from various faiths. Through extensive research I was able to conclude that one of the most influential contacts was with the Zoroastrians of ancient Iran.

The first thing that will be presented is a basic history of the Zoroastrian faith, followed by its influences on the Abrahamic religions. In determining how Zoroastrianism influenced Judaism, Christianity, and Islam I compared the Zoroastrian religious texts with the other religion's texts, drawing specific examples in which Zoroastrian influence is most evident. The sources of my research not only include specific quotes from the Torah, Bible, and Quran, but also from field research in an Atlanta Zoroastrian community, books about ancient Persian history, and travel to Iran.

Back to Authors
Back to Titles

Cara M. Altimus
MODELING AND ANALYSIS OF THE BIOLOGICAL CLOCK IN *NEUROSPORA CRASSA*.
Dr. Jonathan Arnold, Dr. H. Bernt Schuttler Department of Genetics, University of Georgia, Athens, GA 30602

A biological clock is a recurring set of reactions within a system that produces an oscillating pattern. Unlike a traditional “clock,” a biological clock can run continuously so long as all reaction components are present. Reaction rates are the main variants.

Genetic networks are used to understand the relationships between genes, RNA, and proteins. These models show which genes are active, how they become active, what their products do, and their relationships with other genes and their products in the circuit. Then an ensemble of genetic networks for the biological clock was identified, fitting available RNA and protein profiling data. The fitted ensemble was used to identify essential features of the genetic network needed to sustain oscillations. Two features that appear necessary for oscillations are: (1) cooperativity in the action of two clock components, the White Collar (WCC) protein and Frequency (FRQ), and (2) a closed feedback loop in clock components. Along side the ensemble experiments, local stability analysis was done to examine equilibrium properties of the genetic network. Oscillations will only occur if the system does not have a stable fix point. Analytical conditions for instability are derived, permitting

oscillations. In short, the clock needs several interacting proteins, a negative feedback loop, some cooperativity and the absence of a stable fix point to which the system would otherwise equilibrate.

Back to Authors
Back to Titles

Prashant Amin
Identification and partial characterization of insertional mutants in a family of putative glycosyltransferases that may be involved in plant pectin biosynthesis.
Xiaogang Gu and Michael G. Hahn; University of Georgia, Complex Carbohydrate Research Center and Department of Plant Biology.

All plant cells are surrounded by a cell wall that not only provides form and structure to the plant, but is also the interface where plant cells interact with each other. The cell wall is predominantly made up of polysaccharides. Significant advances have been made in our knowledge of the structures of many polysaccharides, but little is known about their function and biosynthesis. We are studying the biosynthesis of pectins, a group of polysaccharides that form one of the macromolecular networks within plant cell walls. We have identified a small gene family thought to encode a group of glycosyltransferases involved in pectin biosynthesis. We are trying to determine the function of the genes in this family by isolating and characterizing plants carrying insertional mutations in these genes. Arabidopsis thaliana seeds with T-DNA inserts within the genes of this glycosyltransferase family were obtained from the Salk Institute. Seeds from the Salk Institute were planted and allowed to grow into mature plants and set seed. Healthy leaves were harvested from individual plants. DNA was extracted from the leaves using rapid DNA extraction techniques. PCR was then used to amplify the part of genes thought to contain the insert. Finally, gel electrophoresis was used to identify the insertional mutants. So far, we have identified Arabidopsis plants that are homozygous for mutations in two of the genes in the gene family. Seed from these plants are being grown to obtain sufficient tissue to analyze their cell walls for compositional changes resulting from the mutations.

Back to Authors
Back to Titles

Chantelle Anfuso and Disha Chhabra
Generating Expressed Sequence Tags from Sorghum bicolor
Dr. Lee H. Pratt and Ms. Shana Seamans

Expressed Sequence Tag (EST) sequencing is a process that allows expressed genes in particular tissues or cell types to be identified through the utilization of complementary DNA (cDNA) libraries. These cDNA libraries are compiled through the reverse transcription of mRNA in an organism's cells. For this project, the organism is Sorghum bicolor, or sorghum, a plant similar to maize. Unlike maize, however, sorghum is capable of withstanding many harsh conditions such as drought, surplus hydration, surplus salinity, and a variety of chemical compositions in its soil. The purpose of this project is to use EST sequencing to identify sorghum's expressed genes. This process begins by inserting cDNA into a plasmid vector of known sequence. The plasmids, all containing different cDNA sequences, are inserted into separate Escherichia coli cells, which are then allowed to multiply. The plasmids were then isolated from the bacterial cells and purified in a three-day process after which each unidentified cDNA sequence was sequenced from both the 3' and 5' ends and analyzed for quality. The sequences will be inserted into a computer database to be compared with other EST data in order to separate highly expressed genes, which are transcribed frequently, from genes that are unique to a particular environmental stress. The discovery of the genes in sorghum used for resistance to environmental stress will contribute not only to the understanding of sorghum's endurance, but will hopefully lead to methods of improving crop plants, which may prove less durable.

Back to Authors
Back to Titles

Tony Anfuso, Matthew Gray
Developing a Fast Plant Expression System to Identify Biosynthetic Genes Involved in Pectin Synthesis
Dr. Maor Bar-Peled

Pectin, the most structurally complex wall polysaccharide, is involved in many plant cellular processes such as cell-cell adhesion, cell-cell recognition, and pathogen recognition. Recent studies provide evidence that pectin may have important health benefits, most notably in the treatment of cancer. In one study, citrus pectin was found to inhibit tumor growth, angiogenesis, and metastasis in mice injected with human breast carcinoma cells. In order to build upon the initial findings, greater understanding of this complicated polysaccharide is essential. While there has been much progress in determining the structure of pectin in recent years, its synthesis remains poorly understood. A crucial step in pectin synthesis is the synthesis of 16 distinct nucleotide-sugars. These activated sugars serve as the immediate substrates for the enzymes that construct pectin. This project's purpose is to design an expression system to identify biosynthetic genes involved in nucleotide-sugar synthesis. Expression of the putative biosynthetic genes in E. coli has been a successful and fast system with previous genes, but has been unsuccessful with the putative UDP-apiose synthase gene as well as other putative genes in past attempts. In this experiment, a stable GST protein was tagged to the protein encoded by the putative UDP-apiose synthase gene, enhancing protein stability and therefore protein expression. Using this GST-fusion method, the alleged UDP-apiose synthase gene is one step closer to being confirmed, making this a promising and fast method for identifying putative genes encoding unstable proteins.

Back to Authors
Back to Titles

K. Ryan Armstrong
Apoptosis of pancreatic exocrine cells in birds infected with Newcastle disease viruses

Newcastle disease virus (NDV) is a highly infectious viral disease of many species of birds, including poultry. In this experiment, two virulent strains of NDV were introduced into chickens, turkeys, and pigeons. The pancreatic tissues were harvested for immunohistochemistry (IHC) for viral nucleoprotein to demonstrate viral distribution, and IHC for active caspase-3 and TUNEL assay to detect apoptosis. The pancreatic lesions of each protocol were then compared, demonstrating the correlation between NDV and apoptotic cells in the pancreas.

Back to Authors
Back to Titles

Robert Brady & Nader Amir
Malleability Of Interpretation Bias In Social Anxiety And General Anxiety
University of Georgia

Individuals with anxiety tend to interpret ambiguous cues as negative (e.g., Amir et al., 1998, Constans, Penn, Ihen & Hope, 1999; Stopa & Clark; 2000). Although one goal of cognitive behavioral therapy is to change the cognitions of individuals with SA and generalized anxiety disorder, it would be more efficient if these biases could be changed experimentally. Recent studies suggest it may be possible to change information processing biases in anxious individuals (e.g., Mathews & Mackintosh, 2000). In the current study, we attempted to change interpretation bias for threat in individuals and examined the effect of these changes on self-report of anxiety. Participants were individuals who reported either high levels of social anxiety or general anxiety. Participants first saw either a positive or a negative prime (e.g., graceful or clumsy) on the computer screen. They then saw an ambiguous sentence (e.g., You dance at the party) and were asked to decide if the word and sentence were related. The computer then provided feedback as to whether their answer was "correct" or "incorrect". Participants were assigned to either a positive training condition or a placebo condition. In the positive training condition, feedback was contingent on their response, (e.g., when the first word was positive, the correct answer was 'yes, they are related.' When the word was negative, the correct answer was 'no, they are not related.').

Therefore, the feedback trained participants to interpret ambiguous information in a positive manner. In the placebo condition, participants received random feedback that was unrelated to their responses. Preliminary results suggest that participants in the positive training condition were faster at deciding an ambiguous sentence had a positive interpretation than were those in the placebo condition. Moreover, they chose more positive interpretations of ambiguous test sentences after positive training than after the placebo. These results suggest that speed and direction of interpretation can be changed using this paradigm. Thus, this training shows promise as an adjunct to traditional cognitive behavioral treatments of anxiety.

Back to Authors
Back to Titles

Mary Elizabeth Brice
Characterization of Microorganisms from Deep Sea Sediment Samples
Mr. Kevin Lee, Mr. Isaac Wagner, Dr. Juergen Wiegel, Department of Microbiology, University of Georgia.

During the Ocean Drilling Cruise (Leg 201) from January, 2002 to March, 2002 in the Eastern Equatorial Pacific Margin samples were obtained to study the presence of anaerobic thermophilic microorganism in various depths of marine deep sea sediments. Four pure cultures were obtained through enrichments performed during the cruise and subsequently purified. Three of the samples came from Leg 201 Site 1227 (Peru Margin) with an ocean floor temperature of 9.0oC (450m below sea level). The other isolate came from Site 1228 (Peru Margin) with an ocean floor temperature of 12.0oC (252m below sea level). All of the isolates came from samples of cores ranging from 1-9m in the upper sediment depth. Preliminary analyses based on 16S rRNA sequence analysis suggest these isolates represent a novel genus in the vicinity of Thermovenabulum or Thermoanaaerobacter. Characterizations includes determination of substrate spectra, NaCl requirement, yeast extract, pH, and temperature profiles of two of the isolates is underway. Preliminary results show an optimal yeast extract concentration of 2% and an optimal pH of 8.0 and 7.0 for the isolate 201-1228P and 201-1227G, respectively. The isolation and characterizations of these novel thermophilic microorganisms gives insight into the distribution of thermophiles in marine sediments as well as the fact that thermophiles can survive for decades at suboptimal temperatures in these sediments.

Back to Authors
Back to Titles

Dennise L. Brinson, Ivomar Oldoni, and Maricarmen Garcia
Examination of peptide specific antibodies for detection of Infectious laryngotracheitis virus (ILTV)

ILTV causes an acute respiratory infection of chickens with moderate mortality, and a decline in egg production. The disease can be easily spread among large poultry production areas if not detected rapidly. Therefore rapid and specific tests for the detection of infected poultry are fundamental to control the disease.

Antibodies against glycoprotein E peptides had been raised in rabbits. We are in the processes to characterize the specificity and reactivity of these antibodies, and their potential use as a tool as a rapid diagnostic test for detection of ILTV infected poultry.

Back to Authors
Back to Titles

Josef Broder
Operational Characteristics of a Mobile Spectral Imaging System
Dr. Chi N. Thai, Biological & Agricultural Engineering Department

Background:

Our research involves the characteristics of vehicle mounted spectral imaging systems for plant health detection.

Proposed Project:
Our method of gathering spatial crop health data involves collecting spectral images via a camera mounted on a tractor to maximize spatial information while minimizing problems of weather and timeliness (as compared to satellite operations). To increase the sampling rate, our camera takes a series of strip-images as they move down a row of crops (push-broom technique). These images must be compiled into a coherent mosaic image with minimal loss in quality and information. The goal of the first phase of the project is to find an optimum strip-image width to minimize final image distortion.

This vehicle-mounted imaging model was simulated in a laboratory setting using a fixed camera mounted above a mobile translation stage. The stage was moved at discrete intervals, and images were taken at each interval to simulate motion. This experiment was performed at various camera angles, as was a second experiment involving rapid image capture as the stage moved continuously below the camera.

Outcome:
The data reflected a linear trend in optimum strip width versus camera velocity, as well as strip width versus viewing angle. These results were consistent with known imaging phenomenon; smaller strip widths minimized distortion and high velocities and oblique camera angles. The linear regressions developed during this experiment could be used in the next phases of the project to predict optimum camera setting for given imaging situations.

Back to Authors
Back to Titles

Melissa Cabinian
Characterization of Cell Lines Derived from Feline Injection-Site Sarcomas
Karen K. Cornell, DVM, Ph.D., Department of Small Animal Medicine and Surgery, College of Veterinary Medicine, University of Georgia

An injection-site sarcoma is a malignant tumor of cats that arises at the location of a previous injection, commonly a vaccination. These occur in approximately 5 of every 10,000 cats vaccinated, are locally aggressive, and spread to other organs in 25% of cats. Complete removal of the tumor is often impossible and cure is rare. We established cell lines derived from 1) a primary injection-site sarcoma, 2) a metastatic lung tumor, and 3) tumors that developed after intact tissue transfer to athymic mice. The growth characteristics and invasive capabilities of the cell lines were determined in vitro in addition to elucidating the in vivo biological behavior of the tumor in athymic mice. Proliferation rates were measured using the CyQuantTM Cell Proliferation Assay yielding population doubling times. Tumor cell invasiveness was assessed using gelatin zymography to evaluate matrix metalloproteinase activity. Tumorigenesis and metastatic potential were studied by injecting tumor cells subcutaneously in athymic mice. Mice were sacrificed and complete necropsy and histopathologic examination performed. Currently, there is no model of this feline cancer. Through the characterization of cell lines derived from injection-site sarcomas, our goal is to develop a rodent model of this tumor in order to study potential genetic markers of prognostic value and possible therapeutic options.

Back to Authors
Back to Titles

Martha Rose Calamaras
Emotion Socialization and Regulation in African American Parent-Child Dyads

This study investigates maternal socialization of children's emotion in a sample of 70 African American parents living in poverty. Of particular interest is the extent to which negative emotional expression (i.e., the expression

of anger, sadness, and fear) is inhibited in the parent-child dyads and what unique environmental factors (e.g., poverty and discrimination) account for making such inhibition functionally adaptive. Parents and their children participated in a video-taped interaction task (Shipman & Zeman, 2002) that was coded for emotion validation/support and invalidation of children's emotion (Schneider & Shipman, 2003). Maternal socialization will be investigated as a function of emotion type and child gender. Further, relationships between parental emotion socialization and children's psychological adjustment (i.e., internalizing, ex! ternalizing difficulties) will be examined. Findings will be discussed with regard to how maternal socialization strategies may facilitate adaptation within their family and neighborhood context.

Back to Authors
Back to Titles

Lauren Cantwell
Cloning Genes from the *T. cruzi* Genome and Observing Infectivity of Wild Type *T. cruzi* Compared to the Cloned Gene Products

Trypanosoma cruzi, a protozoan parasite, causes Chagas disease, a potentially fatal disease involving heart and gut tissue in humans. T. cruzi expresses cysteine proteases (cp), enzymes that aid in invasion of mammalian cells and replication of the parasite within cells. The important role of cp in parasite survival in mammals suggests that these proteins may be good vaccine candidates. The cp are encoded by an estimated 131 genes in T. cruzi. To investigate if the cp could be an effective vaccine, we will inject mice with different sets of cp genes and assess the ability of the cp genes to protect against lethal challenge with T. cruzi. The first step toward generating cp vaccines was to design primer combinations to amplify the various cp gene variants. Using these primers we then used polymerase chain reactions to amplify the target sequences from T. cruzi DNA. Adaptamer reactions were then performed to attach sequences needed for cloning into Gateway (invitrogen) adapted vectors. Currently, two cp clones are ready to be shuttled into a vaccination plasmid, 2 cp clones are ready to undergo transformation in an E. coli medium, and 11 cp clones are undergoing the adaptamer reaction. Once all clone products are obtained, these will be shuttled into a vaccination plasmid and injected into mice as DNA vaccines. The ability of different cp clones to protect the mice against lethal infection with T. cruzi will then be assessed.

Back to Authors
Back to Titles

Nicholas Capito
Cytoxic Effects of A?42, RAGE, and A?42 & RAGE Complex of PC12 Cells and the Formation of of Senile Plaques in the Brains of Alzheimer's Patients

Alzheimer’s disease (AD) is a neurodegenerative dementing disorder affecting half of our elderly population of ages 85 and above. Senile plaques (SPs) composed of a 42 amino acid beta amyloid (A???peptide fragment have been recognized as the hall mark of AD-patahogenesis; though the contributory factors for SPs are not known yet. Autoimmunity seems to play a promient role in disease progression. We hypothesize that age is one of the crucial factors in AD initiation and an important aging process to form advanced glycation end products (AGEs) and their receptors (RAGEs) to complex with A?42 might play a major role in AD. To test our hypothesis, we conducted in-vitro and in-vivo experiments. Differentiated PC12 cells treated with 10-100?M concentrations of in-vitro incubated A?42??RAGE, and A?-RAGE complex showed that the A?42?RAGE complex produced a much greater cytotoxic affect on PC-12 cells compared to cells incubated with either RAGE or A???? alone. In another series of experiments, plasma and autopsy brain tissue extracts derived from individuals with AD and normal elderly control individuals revealed a 2-3 fold increase in RAGE and A?42 IgG levels in the AD samples relative to the control samples. These samples also exhibited a near 1:1 ratio between RAGE and A?42 IgG levels indicating that the auto-antibodies were binding to the same protein or protein complex. These experimental results suggests that RAGE and A?42 complex in vivo, and that the complex is a highly potent immunogen capable of provoking auto-immune and cytotoxic responses in both the

peripheral blood and within the brain.

Back to Authors
Back to Titles

Cameron F. Cavola
The Identification of *Trypanosoma cruzi* Surface Proteins Using Bioanalytical Mass Spectrometry

The protozoan *Trypanosoma cruzi* is the causative agent of Chagas disease, a major ailment of millions of people in the rural areas of South America. Humans represent an intermediate host for this parasite while the reduviid bug, *Triatoma infestans*, is the definitive host. The life cycle of this organism cycles between these two hosts and involves four life stages: metacyclic trypomastigotes, epimastigotes, amastigotes, and trypomastigotes. The surface proteins expressed during these life stages represent the majority of what is displayed to the immune system, and thus are critical to the subsequent immune evasion. This surface includes transmembrane and glycophosphatidylinositol (GPI) anchored proteins with functions ranging from invasion to control of morphological transitions. In our study we attempted to isolate the membrane and strip the glycosylation from mucins using a process known as ß-elimination. Following purification and digestion, we sequenced the resulting peptides using tandem mass spectrometry and identified them by searching the spectra against the newly annotated *Trypanosoma cruzi* genome. The identification of these surface proteins and further investigation into their role during infection may lead to their future use as vaccine targets.

Back to Authors
Back to Titles

Krisda Chaiyachati
Uncovering the structural function of an additional amino acid sequence in the long form of augmenter of liver regeneration (ALR) through biochemical and structural comparisons of long and short ALR

Though much data has contributed towards understanding the role of augmenter of liver regeneration (ALR) in regeneration, little is known about the biochemical and functional properties of the protein. A sulfhydryl oxidase hepatotrophic factor originally identified through bioassays of regenerating rat and canine livers following partial hepatectomy, ALRp is a cone-shaped helical bundle containing a bound FAD molecule at the mouth of its cone. The presence of FAD is of particular interest for two reasons. One, the high stability of FAD in the absence of an identifiable dinucleotide binding motif suggests a unique FAD binding motif. Secondly, ALR is the first FAD containing growth factor ever identified, implying the possibility that ALR is a redox-sensitive cellular regulator. This study uncovers the role ALR's structure plays in FAD reduction by focusing on two forms of ALR: a long and a short form, Caenorhabditis elegans ALR and rat ALR, respectively. C. elegans ALR contains an additional disulfide bridge (C9-C13) in a 35 aa sequence preceding the N-terminal of the 125 aa sequence characteristic of rALR. It is believed that these additional cysteines in C. elegans may play a role in the stability of FAD. Therefore, recombinant forms of short C. elegans ALRp without the additional 35 aa sequence as well as a long rALRp containing the 35 aa's were synthesized and compared to their respective counterparts through examination of crystal structures and reduction kinetics in the presence of dithiothreitol (DTT). Conclusions are made about the function of the additional amino acid sequence.

Back to Authors
Back to Titles

Krisda Chaiyachati, Edmund Morrell, and Sachin Varghese
The PATRIOT Act: Amending the Foreign Intelligence Surveillance Act and Diminishing Civil Liberties
Dr. Loch Johnson, Department of Political Science, University of Georgia

Under the guise of national security and September 11th, the PATRIOT Act repeats a pattern in which the U.S. government has relaxed the protection of civil liberties and fundamental rights. A history of Executive Branch

agencies neglecting fundamental rights led to the Foreign Intelligence Surveillance Act (FISA) and the Church Committee. Reforms, recommended by the Church committee and implemented through FISA were put in place to protect the American people from an overzealous government or intelligence agency blinded by its pursuit of national security. The PATRIOT Act's amendments weaken the protection of civil liberties and effective accountability. The Act expands governmental powers and removes many of the existent safeguards, leaving Americans open to an empowered executive branch unrestrained by effective oversight. Since its inception, actions taken under the provisions of the PATRIOT Act have been shrouded in secrecy, even from Congressional oversight committees. In order to prevent violations mirroring those prior to FISA and the Church Committee, reforms must be made to the Act. What is needed is more consensus, more intense oversight which does not only include a reactive judiciary but also a constructive, proactive Congress, and more candidness about what freedoms are being sacrificed in order to protect the United States from terror. Only after a nation weighs the costs of a domestic war on terror can it strike the proper balance between freedom and safety.

Back to Authors
Back to Titles

Natasha Chua Tan, CURO Apprentice
Wealth Creation in America
Dr. Charles Hofer, Department of Strategy & Entrepreneurship, Terry College of Business, University of Georgia

How do most Americans generate personal wealth? Fred J. Young, former Vice President of the Harris Trust & Savings Bank of Chicago, analyzed, over a 40 year period, the sources of wealth of Harris clients who provided the bank with over $1 million in capital for investment. His study concluded that the two most prevalent ways of accumulating wealth were through starting and selling a business and real estate investments. In this research, we apply Young's research principles to a new business climate. Data will be collected from local trust departments in the Athens-Atlanta area through interviews and questionnaires. The information gathered will describe the basic strategies used by Americans today to accumulate/earn significant wealth. We will also review Young's How to Get Rich and Stay Rich and perform a comparative analysis of our data versus his observations. With these results, we will be able to determine what factors drive the greatest creation of wealth in America, and explain the role of entrepreneurship and small business creation in the modern economy.

Back to Authors
Back to Titles

Susan Chung
Variability in the OGLE Sky Survey
Dr. Scott Shaw

Eclipsing binary systems in which both stars are cool M stars are exceedingly rare. Fewer than ten are currently known. Searching large sky surveys, such as OGLE II, holds the promise of doubling or tripling the number of known M-type eclipsing binaries stars. Multiple computer programs run on data sets taken by the OGLE Sky Survey group has carefully selected variable stars out of forty nine fields of the Galactic Bulge. Each field contains about 2000 to 8000 variable stars. Currently, computer programs have not been able to classify all the various types of variable stars nor have the programs been able to identify which stars are M-type eclipsing binaries. Using Excel's spreadsheet, AVE's light curve graphing and phasing program, and standards set in rejecting period aliases, we are now closer to our goal of automatic selection through the use of computers.

Back to Authors
Back to Titles

Anthony Cohen

Effects of nutrients on leaf decay and detritivores in a headwater stream.
Wyatt Cross, Jennifer Greenwood, Roger Hilton, Dr. Amy Rosemond, Institute of Ecology, University of Georgia

Nutrient enrichment of stream ecosystems is a widespread problem caused by non-point source pollution. Excess nutrients profoundly affect aquatic ecosystems and are an important cause of declining water quality world-wide. The effects of nutrient enrichment are known for primary producer based systems, but are less well-known for detritus-based systems. To test the effects of nutrients in a detritus-based system, UGA researchers have continuously added nitrogen and phosphorus to a headwater stream at the Coweeta Hydrology laboratory in North Carolina and compared effects to a reference stream. This study examines effects of the continuation of that enrichment from year 2 to year 3. Decay rates of leaves were measured as an indication of effects of nutrients on invertebrate and microbial processing of organic matter, which is an important ecosystem process. The decay rate and invertebrate biomass and composition will be determined from litter bags that were placed in the enriched stream and reference stream and compared to values determined from previous years of enrichment. The leaf packs were assembled using rhododendron leaves from the fall. The packs were collected at 14, 30, 55, 70, and 118 days. Invertebrates will be sorted from leaves, preserved in formalin and keyed to species. Invertebrate biomass will be determined from measuring individuals to the nearest 0.5 mm and using length-weight regressions. These data will add to our understanding of nutrient effects in detritus-based aquatic ecosystems and help to predict the effects of enrichment on higher trophic levels in detritus-based food webs.

Back to Authors
Back to Titles

Nathan Copeland
***Mycobacterium marinum* Promoter Library**

Mycobacterium tuberculosis is responsible for the deaths of three million people annually, and it has been estimated that possibly 1/3 of the world's population is infected. In addition, *M. tuberculosis* is the second leading killer of those afflicted by AIDS. For these reasons, the study of*M. tuberculosis* is of vital importance. However, due to the technical difficulties associated with research on this pathogen, a surrogate organism, the marine relative, *M. marinum*, has emerged as a popular alternative. *M. marinum* is a close genetic relative of *M. tuberculosis*, possesses a faster growth rate, does not cause serious human infections, and is more susceptible to genetic manipulation. Similarities in the initial host-pathogen interactions between *M. marinum* and *M. tuberculosis* have been observed suggesting that these bacteria may possess common virulence mechanisms. In this study, we will identify *M. marinum* virulence genes using promoter trap technology. An *M. marinum* promoter library possessing a green fluorescent protein reporter has been created. Once these constructs are transformed into *M. marinum*, fish macrophages will be infected, and the clones of interest that fluoresce green will be isolated. The promoter sequences will be identified, and the *M. tuberculosis* homologues of these genes will be studied.

Back to Authors
Back to Titles

Matthew Crim
Functional Analysis of CD8+ T cell Epitopes in Experimental Trypanosoma cruzi Infection Using ELISPOT and In Vivo Cytotoxicity Assays

Trypanosoma cruzi is the etiologic agent of Chagas disease, a condition affecting sixteen to eighteen million people and causing fifty thousand deaths each year in Central and South America. A murine model mimics human infection as parasite persistence in muscle tissue is common in both mice and humans. Studies in gene-knockout mice have demonstrated the importance of CD8+ T lymphocytes in the concerted immune response to combat infection. However, little is known about the antigen specificity of the CD8+ T cells activated by this infection. The first identified epitope of the CD8+ T cell response to T. cruzi was peptide 77.2 (VDYNFTIV), a

member of the transialidase gene family consisting of over 600 genes. A BLAST search of the transialidase gene family in the TIGR database revealed over 400 peptides with homology to peptide 77.2. The ability of these peptides to stimulate a CD8+ T cell response was examined utilizing an in vivo cytotoxic T lymphocyte assay and an ELISPOT assay of cytokine production. Four peptides were identified that elicited both specific cytolytic activity and interferon gamma production by CD8+ T cells. Peptides were also identified that induced interferon gamma production without corresponding cytotoxicity. Current work is focusing on the question of whether the homologues of the peptide 77.2 epitope can antagonize the response to each other through altered peptide ligand effects. We are examining the hypothesis that peptides derived from transialidase gene family members that do not fully activate the CD8+ T cells are involved in parasite evasion of the host immune response.

Back to Authors
Back to Titles

Shaylee Dave
Estrogen Signaling in Coronary Artery Smooth Muscle
Dr. Richard E. White, Ph.D., Pharmacology, Medical College of Georgia, Augusta GA 30912

Estrogen has been known to be beneficial in reducing cardiovascular dysfunction by acting as a vasodilator. Recent studies have suggested that restoration of estrogen through hormone replacement therapy actually hinders the prevention of cardiovascular dysfunction. The purpose of this study has been to explore the possible dual role of estrogen. Through pharmacological techniques such as patch-clamp and tension studies; and biochemical techniques such as immunoblotting we have been able to study whether estrogen stimulates the generation of nitric oxide (NO), a vasodilator or superoxide (O2-), a vasoconstrictor. Single cell-attached patch clamp studies showed that estrogen opens the large conductance voltage-and-calcium dependent potassium channels (BKCa) in porcine coronary artery smooth muscle cells. Fluorescent studies showed that estrogen stimulated the generation of NO through NOS. The present study suggests estrogen stimulates neuronal nitric oxide synthase (nNOS), in particular, to generate NO. Immunoblotts of denuded coronary arteries showed a greater expression of nNOS in comparison to the other two isoforms. Patch-clamp studies showed that inhibition of the ability of nNOS to produce NO by using N?-propyl-L-arginine (L-NPA), blocked the ability of estrogen to stimulate the opening of BKCa channels. Tension studies showed that when the ability of NOS to produce NO was inhibited, estrogen, caused a contraction

Back to Authors
Back to Titles

Jessica Davenport
Environmental regulation of extracellular protein synthesis in *Staphylococcus aureus*.

A number of previous studies have shown that variation of environmental conditions can greatly affect the growth and behavior of the major human pathogen *Staphylococcus aureus*. In this study we have characterized the specific effect of alterations in environmental conditions on the production of two major virulence determinants implicated in the pathogenesis of *S. aureus*, aureolysin (*aur*, a zinc-dependant metalloprotease) and the V8 serine protease (*ssp*). Introduction of 1M NaCl into growth media of S. aureus results in a complete lack of transcription proceeding from both the *aur* and *ssp* operons in all strains studied with the exception of the protease hyper accumulating strain PC1839. Indeed even in PC1839 an approximately 5-fold reduction in transcription was observed for both of these loci in the presence of NaCl. Not only did 1M NaCl abolish production of these protease but more profoundly the secretion of all other major extracellular proteins was almost entirely absent. Growth of studies of *S. aureus* at both 25C and 30C also revealed a similar decrease in protease synthesis, without significant variations in final growth yields. Interestingly these conditions did not produce the total lack of extracellular virulence determinants observed in the presence of supplemental NaCl, indicating an alternative mechanism of transcriptional repression. This information has important implications in the ongoing study of the mechanism by which this organism can exist both as a harmless commensal and a potential fatal infective pathogen, and how it alternates between these states.

Back to Authors
Back to Titles

Daniel del Portal
Actin Rearrangement and Hirano Body Formation as Modulators of Apoptosis
Marcus Fechheimer and Ruth Furukawa

Hirano bodies, paracrystalline cytoplasmic inclusions enriched for the cytoskeletal protein actin, have been noted in post mortem analysis of neuronal tissue in patients suffering from a wide variety of neuropathological conditions, including Alzheimer's disease, Parkinson's disease, and amyotrophic lateral sclerosis. The basic physiological role that Hirano bodies play in cells is unknown. Formation of model Hirano bodies can be induced in a variety of cell types by introduction and expression of mutated forms of the *Dictyostelium* 34 kDa actin-bundling protein. Evidence indicates that mouse fibroblast L cells stably expressing a truncated C-terminal fragment (CT, amino acids 124-295) of this protein are less susceptible than wild type cells to programmed cell death (apoptosis) induced by oxidative stress. My research has focused on further exploring the possible relationship between Hirano bodies and apoptosis. Fibroblasts stably expressing the CT protein and exposed to the DNA-damaging drug etoposide, an inducer of p53-dependent apoptosis, were not significantly more viable than wild type cells. Thus, Hirano bodies do not protect cells from apoptosis mediated by the tumor suppressor protein p53. By contrast, in transfected human cervical cancer HeLa cells, the CT protein itself seems to act as an apoptotic trigger. I have experimentally determined by treatment with pharmacological and genetic p53 inhibitors that CT-induced apoptosis in HeLa cells is p53-independent. Thus, the presence of Hirano bodies can modulate apoptosis in a positive or negative way, depending on the cellular context. In all cases studied, the effects of Hirano bodies on apoptosis do not appear to involve p53. These studies of the relationship between model Hirano bodies and apoptosis may contribute to our understanding of the role these inclusions play in disease processes.

Back to Authors
Back to Titles

Dustin Dyer
Energy Dissipation in Nanomechanical Resonators
Dr. Guigen Zhang, Department of Agricultural and Biological Engineering, The University of Georgia
Dr. Michael Geller, Department of Physics and Astronomy, The University of Georgia

Nanomechanical resonators are miniscule pieces of solid that are now being recognized as contenders to replace bulk quartz crystals and surface-acoustic wave resonators to provide more accurate timing in precision measurement equipment. A good resonator exhibits an extremely long resonating lifetime when compared to its period of oscillation, or a high quality factor (Q factor). At present, the combination of mechanical devices and modern electronics has been very successful, but their speeds of operation are much too slow to compete with the speed of today's technology. Small nano-sized materials would make much higher operating frequencies possible; yet, Q factor has been shown to decrease with the decreasing sizes of these materials. Mechanical radiation of energy by the resonating structure into its support and the non-linearity between the different sized resonators are two possible causes for this extra energy loss. There have been studies evaluating the radiation of energy; however, there have not been many studies assessing the non-linearity issue. We have performed non-linear analyses using finite element analysis (FEA) to investigate both possibilities. For this investigation, we developed two dimensional models consisting of cantilever beams with small visco-elastic sections at the fixed ends. Our results using inch sized models suggest that the energy loss through the supports may play a larger role than non-linearity. We are working to overcome hardware difficulties found while creating smaller models to further study these issues at the micro and nano sizes.

Back to Authors
Back to Titles

John W. Foreman
New Shapes in Knot Theory: nth Hulls of Knotted Curves

Recruiting posters and advertisements for graduate math programs, mathematics conferences, and think tanks try to capture the viewer's eye, using beautiful shapes discovered in new research to arouse curiosity. Certainly this is a more effective means catching attention than a drab photograph of numbers and symbols on a chalkboard. A substantial number of these shapes have come from knot theory: a branch of mathematics that has proved valuable both for its applications in genetics, physics, and coding and for the remarkable images that come from its objects of study. One new source of beautiful shapes comes from the nth hulls of knotted curves, which only recently have been modeled on the computer.

The convex hull of a knot is the set of points such that any plane that intersects the set must cut the knot twice. Similarly, the nth hull of a knot is the set of points through which every plane cuts the knot 2n times. The author with the help of advisor Dr. Jason Cantarella has developed a computer program, TwoHull, which given a knot is capable of modeling any associated nth hull. Essentially, TwoHull "carves" the nth hull by cutting along a subset of the planes mentioned above. The 3-dimensional forms produced by TwoHull beautifully represent intriguing properties of ordinary knots and are valuable both aesthetically and mathematically. A short film will be shown of nth hulls as they are carved and rotated.

Back to Authors
Back to Titles

Chris Freedman
Modeling Contributing Factors of Alzheimer's Disease: Expression Studies of Yeast Ste23p

STE23 is a gene of *Saccharomyces cerevisiae* (yeast) that encodes the STE23p protease. Proteases are proteins that cleave other proteins at specific sites. In the case of *S. cerevisiae* , Ste23p is known to be one of two proteases involved in the cleavage of a precursor to the pheromone " **a** -factor," which is a key signaling molecule in the process of yeast mating. Currently, there are no significant publications about Ste23p despite its extensive similarity to human Insulin Degrading Enzyme (IDE), a protease involved with the prevention of Alzheimer's disease. Our lab has found that epitope tagging Ste23p does not affect its function, and this finding has allowed further cellular and biochemical experimentation of this enzyme. In particular, we have found that *STE23* is expressed in all yeast cell types unlike Ax11p (a closely related enzyme). Ste23p is also over-produced compared to Ax11p. Finally, we have found that the presence of a gene named *YDJ1* is needed for optimal expression of Ste23p. We will discuss these findings in more detail and present new data for using yeast as an expression system for IDE. We expect that our finding on STE23 will lead to new insight concerning the life of *S. cerevisiae* and also provide a simple model for understanding more about human IDE.

Back to Authors
Back to Titles

Sarah Fritts
An inventory and assessment of medicinal plants and animals used by traditional healers in Limpopo Province, South Africa
John P. Carroll, Warnell School of Forest Resources, University of Georgia, Athens, GA

Traditional healers play a role in an estimated 80% of the South African population. Harvesting plants to meet this urban demand has become environmentally destructive in some areas. Considerable strain is also placed on several animal species used in traditional healing, many of which are already protected. The origin and accessibility of these natural resources are unknown; therefore, the impacts on the environment have not yet been determined. This study identifies plant and animal species used by a traditional healer in the Limpopo Province, South Africa. Verbal data was collected from the chief traditional healer with the help of a Tsonga

translator. Additional information on species identification, harvest site, cost, parts of species used, ease of getting, and medicinal usage of the species were summarized. Each species' statuses according to The World Conservation Union (IUCN) Red Data List of Threatened Species and the Convention on International Trade in Endangered Species (CITES) appendices were obtained. We identified 69 species, 34 animals and 35 plants. These animals were harvested from Mozambique, 35%, Zimbabwe, 21%, and locally around the village, 21%. At least 35% of the animals are protected under CITES, either under Appendix I, 12%, Appendix II, 15%, or Appendix III, 9%. One animal species is also considered endangered and 3 vulnerable in the Red Data List. We assessed habitat preference of each species and found most animals, 75%, to be savanna/grassland species. Most plants, 86%, were harvested locally around the village. Our data suggests the presence of a large network in trade of animal and plant parts, which includes international boundary issues.

Back to Authors
Back to Titles

Grant Galland and Allison Vogt
The Effects of Benthic Particle Size on Relative Abundances of Stream Fishes
Dr. Gene Helfman, Institute of Ecology, University of Georgia

I investigated possible correlations between benthic particle size and fish assemblages. Particle size is ultimately affected by land use practices, where more land disturbance (=less forest cover) often leads to a smaller average particle size. Widely dispersed, generalist fish species were designated "cosmopolitan," whereas those species restricted to more undisturbed, highland habitats were designated "endemic." Fish were collected in streams in the Little Tennessee River drainage and relative abundances of these two groups were determined. Mean benthic particle size was measured at several points in each reach. Streams with higher average particle sizes had apparently higher endemic to cosmopolitan ratios, but the relationship was relatively weak, indicating that other factors must be involved.

Back to Authors
Back to Titles

Mark Gonzalez and Vanicia Miller
Identifying Expressed Sequence Tags involved in wound response from Sorghum bicolor.
Dr. Lee Pratt and Ms. Shana Seamans

An Expressed Sequence Tag (EST) project utilizes complementary DNA (cDNA) reverse transcribed from mRNA to identify genes expressed in tissues, cell types, or a whole organism under a desired environmental condition. *Sorghum bicolor* is a plant similar to maize that can withstand harsh environmental conditions such as drought and excess salinity (National Grain Sorghum Producers: http://www.sorghumgrowers.com). The purpose of our project is to generate and analyze ESTs from sorghum seedlings that were wounded by crushing one-half of their second leaf and seedlings that were grown on methyl jasmonate media. Methyl jasmonate induces a stress response similar to wounding (Hudgins *et al*., 2004). After reverse transcribing the mRNAs into cDNAs, the cDNAs were inserted into plasmids, which were transformed into *Escherichia coli* bacterial cells. The *E. coli* cells were amplified and the cDNA-containing plasmids were purified. The ends of the cDNAs were sequenced to generate the ESTs. To date, 3702 cDNA-containing plasmids have been isolated, the ends of which are currently being sequenced to produce 7404 ESTs. These sequences are being analyzed for quality and contamination The "good" sequences will be grouped into contigs to eliminate the redundancy observed for highly expressed genes, which are transcribed more frequently than others are and thus likely to be sequenced more often. The numbers of sequences present in each contig will also reveal the relative level of expression of each gene expressed during wounding response. The contig sequences will be compared to a database of known protein sequences via BLAST (Altschul *et al.*, 1990) to identify novel genes and those genes most actively transcribed following wounding.

Back to Authors

Back to Titles

Gehres Paschal
12th Century Medical Treatments Described in Hildegard's Cause et Cure and the Success of 21st Century Pharmaceutical and Medical Research
Dr. Katharina Wilson

Hildegard of Bingen was a twelfth-century nun, writer, theologian, natural philosopher, medical practitioner, political activist and playwright among other tittles. She is also the presumed author of the original medical text Liber simplicis medicinae, more commonly known as Physica, originally presented in a set of five manuscripts. One of the documents, Cause et cure (Causes and Cures) contains twelfth century medical principles and has been preserved in a thirteenth century manuscript. The concepts discussed in Cause et Cure incorporate the Empedoclectic doctrine: four distinct elements- fire, air, water, and earth-which are essential to all life. These four basic elements are also an integral part of the ideas illustrated in the Corpus Hippocraticum, one of the most well-known medical documents of Antiquity. Each of the Empedoclectic factors corresponds to the four fundamental bodily fluids: yellow bile, blood, phlegm, and black bile. In Cause et Cure, Hildegard describes a healthy person as having a balance of these four bodily fluids; therefore, a diseased person would have an imbalance of any of the four bodily substances also known as "humors." In Cause et Cure, Hildegard prescribes treatments that essentially readjust the imbalance of the humors via diet, medication, lifestyle, as well as the elimination of waste matter via sweating, sneezing, crying, vomiting and bloodletting. Many of Hildegard's proposed medical treatments stem from the Hippocratic tenet "cure opposites with opposites." Hildegard also prescribes many natural remedies such as the use of bear fat and wheat for treating hair loss, as well as a sage and vinegar concoction that is used to treat migraine headaches. Between 1983 and 1994, over forty percent of the drugs approved by the FDA were derived from natural compounds. Furthermore, natural compounds often provide a lead to the development of new synthetic drugs. In intend to deconstruct particular natural remedies described in Cause et Cure, and through contemporary scientific analysis, reveal any similarities in the chemical basis of various medications used today. I would also like to examine the possibility of additional research surrounding the natural remedies described in Hildegard's Cause et Cure in the context of future drug discovery.

Back to Authors
Back to Titles

Elizabeth Goodwin
Chronic Illness and the Benefits of Therapeutic Summer Camp
Mentor: Dr. Ronald Blount

Children with chronic medical conditions are often subjected to greater stressors and less socialization and independence than are healthy children. The main concentration of my research has been a therapeutic summer camp for children with cardiac disorders. Attending this camp provides these children with an opportunity to be in the presence of other children with similar cardiac conditions, fostering a sense of likeness and support as they participate in the camp activities, which often reach far beyond the scope of the activities they are able to engage in elsewhere. Parents are given a respite during which time they are not primarily responsible for providing their child's care. The study's purpose is to evaluate the effects of the summer camp on these children and their overall functioning. Measures have been gathered at three stages: pre-camp, at-camp, and post-camp. Both the children and parents fill out measures, allowing the collection of data on aspects such as prior camp experience, maternal separation anxiety, camp expectations, and psychosocial functioning. The data that has been gathered from this study provides insight into the psychology of pediatric chronic illness and will allow for improvement in approaches used to treat these children beyond their illnesses. We hope to continue gaining insight into the effects that cardiac disorders have on children's lives and to evaluate whether therapeutic summer camp can provide a normalizing experience for children whose lives are often far from "normal."

Back to Authors

Back to Titles

Patrick Gosnell
The Beautiful and the Absurd
(Under the direction of Prof. Ben Reynolds)

Beauty is all around us. At least, that is the goal of every advertising agency and marketing executive in America. Every day we are bombarded with a multitude of images, all of which are designed to "educate" the public as to what Beauty truly is. However, most of us know the bitter truth: the marketed glamour image is simply a perversion of reality. Attempting to achieve this image is hopeless at worst, absurd at best.

My photographs turn the tables on the glitz and glamour of the fashion world by showing that there is nothing very pretty about it at all. Many aspects of this industry can be considered slightly insane – from the painful contortions the models must perform, to the outrageous clothing that nobody actually wears in real life. I create images that subvert that which is beautiful by adding elements such as gore, excess, and the bizarre. My goal in highlighting the "dark side of beauty" is for the public to lighten up and to take themselves, and how they are expected to look, a little less seriously.

Back to Authors
Back to Titles

Paulette A. Green
Conspecific Sperm Precedence and Speciation in *Drosophila pseudoobscura*

In nature many species coexist sympatrically without interbreeding which is prevented by strong reproductive isolating mechanisms, i.e., pre-mating isolation and post-mating isolation (Dobzhansky,1951). We have studied possible reproductive isolating mechanisms utilizing 1) two races of *D. pseudoobscura*, Mainbody (M) and Bogota (B), that are in the process of diverging and 2) two sibling species, *Drosophila pseudoobscura* (O) and *D. persimilis* (S), that diverged 500,000 years ago. We compared the amount of sperm transferred and the number of progeny after mating females with conspecifics and heterospecifics. There was a significant difference in sperm transfer between conspecific matings and heterospecific matings: Bogota female accepted more sperm when mating with Bogota male than when mating with Mainbody male (P=0.0477). The same trend, though statistically insignificant, was observed for Mainbody female (P=0.1435). Tests between *D. pseudoobscura* and *D. persimilis* are still ongoing. When females subsequently mated with conspecific and heterospecific males or vice versa, the conspecific matings produced more progeny than heterospecific matings regardless of order of mating, except for Bogota females (P=0.0145 for M?M?B?; P<0.001 for M♀B♂M♂; P=0.0077 for O♀O♂S♂; P<0.0001 for O♀S♂O♂; P=0.0002 for S♀S♂O♂; P=0.3832 for S♀O♂S♂). In the B♀B♂M♂ the second, heterospecific, male (M) produced more progeny (P=0.0137), and in the B♀M♂B♂ cross there was no difference in the number of progeny by the subsequent matings (P=0.9137). These results suggest a possible role of cytoplasmic incompatibility in hybrids and genes that cause the hybrid inviability we observed in this project.

Back to Authors
Back to Titles

Paulette A. Green
The effect of behavioral interactions between sexes on mate preference in *Drosophila pseudoobscura*

Natural selection is expected to adjust behavior to increase fitness. We tested this hypothesis with *Drosophila pseudoobscura* while observing the relationships between mate preference and fitness. Mate preference was determined in small arenas where a single fly was allowed to choose between two flies of the opposite sex eliminating all possibilities for male-male competition, female-female competition and male coercion or

manipulation of females. Matings were arranged with preferred (P) and non-preferred (NP) partners. Our early studies (Anderson *et al.* , in press) have demonstrated that fecundity was higher in NP matings but not statistically significantly different from in P matings. However, offspring viability was significantly higher in P matings. Subsequently, we measured fitness of males while counting number of sperm delivered to females during copulation. In both male and female choice situations, NP matings delivered significantly more sperm to females than P matings. These results suggest that 1) freely expressed mate preference affects the fitness of offspring; and 2) the increase in fecundity and sperm observed in NP matings may be compensatory behavior for a low viability of offspring from these matings. In attempts to investigate associations between mate preference and mate choice, flies collected from the mate preference tests were observed in mating chambers while measuring courtship and mating behavior. When ecological interaction among individuals was reinstated in the mating chambers, there were no significant differences in number of matings with P and NP partners that we observed in mate preference tests. Males did not discriminate between P and NP females but they significantly more mated with first encountered-females (? 2 = 5.12, p <0.05). However, females did not show significance in matings (? 2 = 3.10, ns) between first courting males and second males. Under ecological and social constraints, we did not find significant differences in copulation latency and duration as well as in number of sperm delivered to P and NP partners. These results support our early observation that individual males and females facultatively vary behavior.

Back to Authors
Back to Titles

Gresham, Cory and Sanchez, Susan
Rodent Vectors in the Transmission of Multi-drug Resistant Pathogens in a Small Animal Teaching Hospital
Athens Diagnostic Laboratory, College of Veterinary Medicine Athens , GA

Previous research has shown the presence and spread of nosocomial *Escherichia coli* and *Enterococcus* strains resistant to several antibiotics in the University of Georgia Small Animal Teaching Hospital . The past work focused on isolates from the environment as well as from animal wounds. Soon after drug-resistant characterizations of these isolates were completed, rodent nests were discovered under rehabilitation cages in the surgery ward. Common house mice (*Mus musculus*) feces contain large numbers of enteric bacteria. This research investigates the possibility that these mice act as a reservoir of previously described isolates. E *scherichia. coli* and *Enterococcus* sp. were cultured on selective media from feces, bedding material, and desiccated rodent bodies found in the nests. At least two strains of *E. coli* resistant to Ceftiofur, Chloramphenicol, Enroflaxin, Ampicillin, and Tetracycline were detected. These two strains were identical by ERIC PCR to strains detected by the past work. *Enterococcus* strains resistant to Gentamycin, Ceftiofur and Ampicillin were also cultured. Total nucleic acid was extracted from strains of both species. A resistant *E. coli* culture was positive for class 1 integrase gene and a florfenicol resistance gene, *flo,* by PCR. Total nucleic acid extracted from fecal pellets were tested by PCR for the presence of *Salmonella* sp., *Campylobacter* sp. and *Leptospira* sp. The implication that rodents may be a vector in spreading, and a reservoir for multi-drug resistant bacteria validates rodent control as a method to help prevent nosocomial infections in the hospital setting.

Back to Authors
Back to Titles

Deepti Gupta
HOW HAS HIV/AIDS IMPACTED THE SUPPLY AND DEMAND OF EDUCATION IN KENYA?

Case Study: Rift Valley Province

Within one decade AIDS/HIV prevalence in Kenya tripled from 4.8% in 1989 to 13.5% in 1999. During this period another alarming trend occurred, the enrollment rate of primary school students began a steep decline. Sparked by a UNAIDS ambassador's comment that related the hazardous effects of HIV/AIDS on education, I wanted to discover if there was a relationship between the rising infection rate and the reversal of education trends in Kenya. I use both primary and secondary data to determine what impact HIV/AIDS has had on the supply and demand of education in Kenya. Within the secondary data, I examine the role of school fees, the perceived benefits of education, the orphan crisis, family income, HIV status of education professionals, and emotional stress. By using regression analysis on primary data collected in May-June 2003 from three primary schools in Rift Valley Province in Kenya, I can present case studies that highlight certain aspects of the complicated relationship. In particular, I consider the function of ethnicity, gender, number of siblings, type of school, and method of HIV/AIDS-education on the students' knowledge and perception of the virus and its spread. The rate at which young people are infected with HIV/AIDS has soared, a 300% increase in the past ten years. Meanwhile, enrollment and teacher participation rates have steadily fallen from 92% to 86%. These numbers are more than likely uner-reported. The paper concludes by identifying the most effective policy changes that are working to alter these disturbing trends.

Back to Authors
Back to Titles

Andrea Haltiner
The Effects of a High Fat Diet and Warm Environment on Leptin in Mice
Ruth B.S. Harris and Tiffany D. Mitchell, Department of Foods and Nutrition, University of Georgia

Mice adapted to a high-fat diet are reported to be leptin resistant but we previously found that young mice fed a high-fat (HF) diet and housed at 23o C remained sensitive to peripheral leptin and lost body fat. This study tested whether increasing environmental temperature combined with a HF diet impaired leptin action by inhibiting thermogenesis. Male C57BL mice were adapted to low-fat (LF) or HF diet from 10 days of age and were housed at 27o C from 28 days of age. From 35 days of age baseline food intake and body weight were recorded for one week and then mice on each diet were infused with 10 ug leptin/day or PBS from an intraperitoneal miniosmotic pump for 13 days. HF-fed mice had a higher energy intake than LF-fed mice and were heavier and fatter. In contrast, serum leptin was lower in PBS-infused HF-fed than LF-fed mice. Leptin significantly inhibited energy intake of both LF-fed and HF-fed mice and this was associated with a significant increase in hypothalamic long-form leptin receptors with no change in short-form leptin receptor. Leptin significantly reduced body fat mass in LF-fed mice but not HF-fed mice. These results suggest that an ability to increase thermogenesis is more important in mediating the reduction in adipose tissue of HF-fed than LF-fed leptin-treated mice and that dietary fat modifies mechanisms responsible for leptin-induced changes in body composition.

Back to Authors
Back to Titles

Elizabeth Hebbard
A Pragmatic Analysis of the Variable Forms and Functions of Noun Phrases in Modern Written French

Modern French grammars tend to mention only one basic sentence structure: a transitive verb surrounded by a subject and a direct object which are encoded as lexical noun phrases. In a study of spoken French, however, Ashby (1999) found that several factors unconsciously influence a native speaker's choice as to how information in spontaneous dialogue is encoded- including its state of animation and its accessibility- and that lexical noun phrases generally do not function as subjects. In this project, I wanted to discover whether the same factors and tendencies existed in written French as well.

In order to do so, I looked to four representative pieces of literature. For each work, I recorded the first fifty lexical noun phrases, their state of activation, their possession or lack of animation, and their syntactic function. The results were surprisingly comparable with those of Ashby's study, implying that the factors that influence a native speaker's choice of sentence structure are based on an intrinsic knowledge that extends to writing as well as speech. The form, and consequently the function, of a noun phrase depends on the accessibility of the information contained therein. Frequently, noun phrases that function as subjects do not introduce new ideas, but rather given ideas; therefore they are often encoded as pronouns. Lexical noun phrases serve other functions such as direct objects and objects of presentative expressions. This proves that overly simplified constructions presented in grammars give an inaccurate impression of the way that French sentences are actually formed.

Back to Authors
Back to Titles

Christina Hendry, Rupa Patel, Susan Sanchez
Genetic Investigation of Nosocomial Infections in the Small Animal Teaching Hospital
Athens Diagnostics Laboratory; College of Veterinary Medicine, Athens Georgia, 30602

Research was conducted at the University of Georgia College of Veterinary Medicine to investigate possible opportunistic organisms and test their susceptibility to clinical antibiotics, in an attempt to quantify and localize the origin of these hospital infections. Selective screening revealed 64% of tested locations produced *Escherichia coli* and 43% resulted in *Enterococcus* sp. growth. Exposure to five antibiotics revealed 25.6% of *E.coli* were resistant to all five drugs, and 32.6% of the *Enterococcus* strains were resistant to three antibiotics. The majority of resistant *E.coli* occurred in the Surgery Ward (SW) and Radiology, with *Enterococcus* growing in the SW, ICU, and computer hallway. Resistant samples were analyzed by PCR, producing genetic fingerprints for individual *E.coli* and *Enterococcus* isolates. For *E.coli* , all locations producing multiple isolate growth had at least two or more genetically different forms. Areas producing the most diversity included Radiology, SW, and ICU, while isolates of similar or the same genetic profiles occurred between several locations, including the SW and Anesthesia floor in front of Surgery. For *Enterococcus* , 78% of locations producing multiple bacterial colonies had at least two genetically different isolates. Areas with the most diversity included the computer hallway, SW and ICU. An abundance of genetically similar profiles were found throughout the hospital and included the computer hallway and SW, and areas between SW and ICU. Resistance profiles for tested *E.coli* show 87% were positive for the *int1* gene, and 50% contained the *flo* or *ampC* gene. Data from previous screenings shows no decrease in the presence of resistant forms of *E.coli* and *Enterococcus* .

Back to Authors
Back to Titles

Luke Hoagland
The Role of Myosin II in Hirano Body Formation and the Impact of Hirano Bodies on Cell Viability
Marcus Fechheimer and Ruth Furukawa

Neurodegenerative diseases such as Alzheimer's disease are an increasing problem in our society, and are pathologically diagnosed by distinctive brain inclusions. Little is understood about actin-rich paracrystalline inclusions known as Hirano bodies. The goal of this project is to contribute to our understanding of Hirano bodies by studies of the mechanism of their formation, and their role in cell physiology. Expression of ?EF1, a gene encoding a mutant form of an acting binding protein, induces formation of Hirano Bodies in wild type cells. By contrast, no cell growth is observed if the ?EF1 protein is expressed in mutants lacking myosin II. These results suggest that myosin II is necessary for Hirano body formation, and that Hirano bodies may be adaptive structures that promote cell survival and growth. Dictyostelium cells with a temperature sensitive myosin II gene mutation will be used to test the role of myosin II in Hirano Body formation and cell physiology. At the permissive temperature, myosin II is fully functional, and these cells should grow normally and form Hirano bodies while expressing the ?EF1 protein. These cells exhibit all of the hallmarks of the

absence of functional myosin II when at the nonpermissive temperature. The myosin II protein function can be halted by simply lowering the temperature, enabling me to observe the effects of the ?EF1 protein on the cells in the absence of myosin II. Cells were transformed with plasmids to drive expression of the ?EF1 protein, and either wild type or temperature sensitive myosin II. Over one hundred clones were obtained, and they are being analyzed for growth at the permissive and non-permissive temperatures, and by electron microscopy. The prospective results of this research may elucidate the mechanism of formation of Hirano bodies, and their role in cell physiology. If the current working model that Hirano bodies are adaptive structures turns out to be correct, then Hirano bodies will be shown to promote survival of cells exposed to physiological stress. If Hirano bodies actually have a positive effect on cell survival, then these results may offer insight into the treatment of patients with neurodegenerative diseases.

Back to Authors
Back to Titles

KIT HUGHES
TAGGING *
Faculty Sponsor: Mark Callahan

Since WiFi (wireless internet access) was introduced to consumers in 1999 it has rapidly grown into an experimental medium. In the same manner street graffiti gained mainstream attention in the 1980s and 1990s when introduced into art and design. Both WiFi and graffiti are also linked by their site-specific nature; one enters into a WiFi zone to access the internet and one experiences graffiti on buildings, sidewalks, etc. Tagging is a wireless application that fuses WiFi and graffiti by allowing Internet users to cover downtown Athens with virtual graffiti.

The project allows anyone using a wireless Internet-capable (WiFi) handheld device with a Web browser to select his or her location from an online map and use a stylus to "tag" images of surrounding buildings on a handheld computer screen. The graffiti is then stored in a database and becomes part of the virtual cityscape of downtown Athens. As with traditional graffiti, each person may add to previous graffiti or create his or her own. The results are available for immediate viewing on the device and on the project's website, www.tagging.us.

Tagging is an art project straddling the genres of technophile net.art and visceral street graffiti; likewise, the technological underpinnings serve as entertainment and research. The project integrates dynamic content with motion graphics on a foundation of database technology. These three areas are reaching conventional use on the Internet but have not been fully explored in a wireless environment. While the primary objective of Tagging has been to serve as a work of art, the users of project will provide useful feedback regarding user interface preferences, bandwidth limitations, and the potential of location-based wireless technology.

Virtual vandals will have their chance at tagging Athens throughout April with handheld devices available for loan through Ideas for Creative Exploration (ICE). The month long interactive exhibition coincides with the CURO symposium.

*Tagging is a word used by graffiti artists to describe writing.

Back to Authors
Back to Titles

Steven Jocoy
Temporal requirement for the amontillado (amon) gene during development in Drosophila melanogaster

We report here the developmental requirements of the homologue of mammalian prohormone convertase 2 (PC2), amon. Animals with mutations in amon die during embryogenesis and early larval development. We have used a conditional expression system to rescue amon mutants past these early stages and to determine the

effects of amon deficiency on later developmental transitions. We show that amon mutants arrest during pupal development and fail to eclose due to defects during metamorphosis. amon mutant pupae fail to evert the head sac, to fully extend the thoracic appendages, and to develop abdominal bristles. The abdominal mutant phenotype is similar to that seen in animals treated with juvenile hormone (JH), suggesting that amon may function to process peptide hormones that regulate JH release. Currently, we are completing our analysis of amon mutant phenotypes. In addition, we are using antibodies directed against the amon protein to determine if AMON is present in neurons innervating the corpus allatum, the juvenile hormone-producing region of the ring gland.

Back to Authors
Back to Titles

Jeremy Johnson
Rocking Out the USSR: A Study of Anti-Soviet Themes in the Lyrics of the Late 1980's Soviet Underground Rock Movement in Leningrad (St. Petersburg)
Dr. Keith Langston, Department of Germanic and Slavic Languages, University of Georgia

In the late 1980's, the Soviet Union experienced rapid currents of social, economic and political change as it approached its collapse. Although glasnost' and perestroika allowed for some discussion of change, a large portion of anti-Soviet dialog remained underground. An underground culture flourished in large cities across the Soviet Union. One of the most popular vehicles of sociopolitical commentary for the underground was avant-garde rock music. Although several scholars recognize the significance of the underground movement, few have discussed the actual texts, subtexts and themes of the movement. The purpose of this paper is to uncover, explore, and analyze subversive anti-Soviet lyrical themes of the underground rock movement in Leningrad (St. Petersburg) during the last years of the Soviet Union. Primarily focusing on the works of the groups Kino, Akvarium (Aquarium), and DDT, this paper develops a dialog between underground avant-garde rock and the sociopolitical change of the time. This paper also explores the significance of Soviet underground youth culture in Leningrad with respect to the role of rock music in the making of the demise of the Soviet Union.

Back to Authors
Back to Titles

Jess Johnson
The Rise of Private Corporations in China: An Analysis of the Evolving Chinese Political Economy
Dr. Clifton W. Pannell, Department of Geography, University of Georgia

The goal of this paper is to determine the extent to which China is transforming from a centrally-directed, state-run economy into an open-market economy with a growing number of privatized businesses. The cultural and economic ties between private businesses and the local government officials are explored to determine if private businesses are truly independent of state control. Primary sources from official Chinese agencies, books, and articles from academic journals pertaining to the contemporary Chinese political economy are used for quantitative data. Discursive explanations from a variety of secondary and primary sources are examined and assessed to determine the extent of control communist party officials (cadres) exert over private businesses. My findings are based on descriptive quantitative data on the number and types of private enterprises in China seen and graphed over time as well as analysis and interpretation of narrative explanatory information from official and secondary sources. These findings suggest that in most cases private businesses thrive only if personal relationships are established with local cadres, although the specific form(s) of this state "corporatism" may vary by location. These personal relationships normally involve the private corporations making gifts to the cadres. This research indicates the emerging form of market capitalism in China differs from the western form and may also vary internally within China by region.

Back to Authors
Back to Titles

Kelly Kopf
Natural Selection for Adaptive Leaf Syndromes across a Severe Environment Gradient

Severe environmental gradients found in nature are often characterized by abrupt transitions between plant communities. These transitions represent an opportunity to understand how natural selection can lead to local adaptation and subsequent genetic differentiation and speciation. However, the presence of strong gene flow can counteract natural selection. The transition between the deciduous forest community of southeastern Lake Michigan and the dune community is especially abrupt. Although very few plants are able to grow across such a severe environmental gradient, the herbaceous plant Arabidopsis lyrata is found growing on the dune and in the adjacent forest. Given the stark contrast of these neighboring environments, there are many traits that would be expected to differ phenotypically. In order to examine this assumption, I measured flower size, glucosinolates, tissue water content, specific leaf area, date of first flower, leaf shape, leaf area, and anthocyanins. However, in a common garden experiment, only two out of the eight traits measured, leaf shape and date of first flower, showed phenotypic differentiation across the environmental gradient. This lack of differentiation in the other six traits is not surprising given previous findings of strong gene flow occurring across the gradient. The phenotypic differentiation that was found in the face of such strong gene flow strongly implicates the action of natural selection.

Back to Authors
Back to Titles

Kevin Lee
Isolation and Characterization of Anaerobic Thermophiles from Uzon Caldera
Dr. Juergen Wiegel, Department of Microbiology, University of Georgia.

The National Science Foundation funded an international, interdisciplinary Microbial Observatory Project to elucidate the microbial diversity and the dynamic relationship between thermophilic microorganisms and the biogeochemistry of selected hot springs. The research includes characterizing novel glycolytic anaerobic thermophiles. Five enrichments from samples taken from two springs (with different pH values) in the North Thermal Field were chosen for the isolation of pure cultures. Enrichments and sub-cultures were incubated under an atmosphere of Nitrogen gas at a temperature of 60°C in media with two different pH values (6.3 and 8.0); glucose, starch, fructose, inulin and maltose were used as carbon and energy sources. Microscopic analysis revealed that four of the five cultures contained multiple spore-forming, rod-shaped bacteria of varying length and diameter. The spores varied in location (center, subterminal, and terminal) and in shape (large and oval; small and round). Isolation of single-cell derived cultures is underway. The cultures did not grow well in agar solidified media suggesting that the bacteria are sensitive to conditions of lower water activity. Isolated cultures will be identified using 16s rDNA sequence analysis. Presently, observed growth behavior suggests that the cultures contain novel glycolytic anaerobic thermophiles. This research can lead to a greater appreciation for the biodiversity that exists in our world and the importance of microorganisms in geochemical and mineralogical processes.

Back to Authors
Back to Titles

Stacey Marcus
Camp Counselor Interactions during Program Activity Leadership: Guiding Staff Supervision

Administrators seek tools to help staff improve skills with campers. Interactions have been documented between elementary-school teachers and students (Stuhlman & Pianta, 2002; Pianta, Cox, Taylor & Early, 1999). Yet, little is known, and less is documented, about what interactions occur during program activity leadership at camp. The purpose of this study was to document verbal and non-verbal interactions while counselors led camp program activities to gain insight into potential staff supervision tools. Four counselors were observed leading

camp program activities at pre-selected intervals during the seven-week season at a non-profit summer camp located in the Southeastern United States. Content of the interactions between counselors and campers was subdivided as primarily instructional, group management, participatory, or social, while level of interaction was documented as non-verbal, directive/imperative, monologue, discussion, or questions (Hamilton, in review). Data was plotted within categories of interaction, activity-days, and across participants. Trends associated with activity-days hold true across participants, as well as, changes in the types of instruction used as the activity progressed during the season. This information was useful on two levels. First, developing categories of behaviors and separating them into desired/undesired behaviors served to more clearly define for the administrator acceptable performance. Second, by collecting observations the administrator has specific information for targeted performance-review with employees. Future steps in this line of research would include the expansion of the project to include multiple raters that documented both the staff interaction and camper response to that interaction.

Back to Authors
Back to Titles

Valerie Marshall
ASSESSING THE POSSIBLE LOCAL COMMUNITY BENEFITS FROM ECOTOURISM OPERATIONS IN KENYA
Advisor: Michael Tarrant

The purpose of this research is to identify ways in which ecotourism operations can benefit local communities in Kenya. In recent years, sustainable development and ecotourism in developing nations have become the new focus of these nations' attempts to preserve their resources and increase their economic stability. However, when promoting the preservation of lands in developing nations, planners must take into account the local communities who base their livelihoods and economies on natural resources. Kenya has had the longest running ecotourism operations in all of Africa, but its past is riddled with government corruption and acquisition of indigenous land, which has hurt the amount of benefits that communities can derive from wildlife protection. This paper will illustrate the range of Kenyan ecotourism operations (government, non-government, and private) and the nature of their relationship with the local people. It will also show how these local communities currently benefit from ecotourism. Considering that Kenya has several setbacks to local community benefits because it is a developing nation, a comparison with a strong ecotourism organization in a developed nation is necessary to discuss how Kenyan ecotourism can improve its local community benefits.

Back to Authors
Back to Titles

Lindsay Mason
"Bad" Girls: The Striking Epidemic of Female Juvenile Offenders
Professor Dean Rojek

Over the past decade, crime statistics for female juvenile offenders has increased dramatically, -- receiving the attention of numerous political officials, -as well as the public and media. The purpose of this study is to delve into the growing phenomena of females offenders in the juvenile justice system; address case studies; and the bias view of the 'typical' juvenile offender. After exploring a variety of studies and journal entries concerning female juvenile offenders, it is my hope to provide statistical information along with an analysis of the various types of crimes and offenses committed by youth, and draw on the increasing correlation between male and female delinquents. The purpose of the analogy is to communicate the need for more in-depth research and preventive crime programs that will education the public, and hopefully, decrease the number of girls entering into the juvenile justice system.

Back to Authors
Back to Titles

Laura Massengale
Buddhism and the Beats : « Dharma bums » or bumming around ?
Dr. Glen Wallis

How did Buddhism affect the counter-culture movement of the Beat Generation in 1950's America? This paper will analyze the works of Jack Kerouac, Allen Ginsberg, and William S. Burroughs, tracing the effects of Buddhism upon literary form, character, and theme. Through literature, I will investigate the transplanting of Eastern thought to Western philosophy, questioning whether the Beats can indeed cultivate Buddhist ideals with a Western lifestyle or if their actions assume only surface Eastern spirituality. Furthermore, if Buddhism does have a meaningful place in the movement, can the revelation and translation of a history with Eastern thought give the Beat work and lifestyle more credibility in the opinion of mainstream America? Can Eastern thought penetrate mainstream American culture through literature?

Back to Authors
Back to Titles

Jennifer McClung
The Personal and Professional Life of a Rural Mexican Primary School Teacher

This study chronicles the daily and weekly activities of Lourdes Spino, teacher of grades one through six in the coffee growing town of Chopan, Mexico. A typical week of work for Lourdes includes walking an hour to visit parents of her students, canceling classes due to unannounced district meetings, and teaching her rural students from agricultural families to think for themselves. Based on visits to the school, interviews with the teacher and all 19 families who have children attending the school, and observations of district meetings and other events, this study was conducted over a period of 5 months in the spring of 2003. A limited amount of research, mostly available only in Spanish, has been published to date on the reality of education in rural Mexico. The purpose of this project is to increase the body of knowledge regarding the lives and work of elementary school teachers in the numerous rural schools of Mexico. The presentation of this study will include photographs of the school and the students, video footage of the teacher performing her daily activities, a review of interviews with families of the community and the teacher, and some anecdotes of classroom observations which personify the teacher's work with her students.

Back to Authors
Back to Titles

Heather Mispagel
Antibiotic Resistance From Sewage Oxidation Ponds
Oconee County High School. USDA Russell Research Center, Antibiotic Resistance Research Unit (ARRU)

In an extensive, multi-year study of antibiotic resistance from sewage oxidation ponds, a mobile home park sewage oxidation pond was discharging high antibiotic-resistant bacteria levels into the Oconee River . T etracycline resistance genes C and G were detected in the 1 st and 2 nd stages and the discharge of the pond going directly into the environment. These genes are usually found in intestinal bacteria, so it can be inferred that they are from a human source. Antimicrobial residue from the beta-lactam family of antibiotics was found in all oxidation pond stages and in the creek above the pond. Tetracycline residue was found in the first and second stages of the pond. Thus, genes coding for antibiotic-resistant pathogens and the antibiotics themselves were documented to survive oxidation pond treatment.

A model simulating biofilm treatment in oxidation ponds was created using a highly antibiotic-resistant *Salmonella typhimurium 3/97* and pond water. Under optimal conditions, *S. typhimurium 3/97* remained in this *in vitro* system. Thus, the competitive inhibition process that assists in the removal of bacteria in oxidation

ponds did not effectively remove *S. typhimurium* 3/97 in this mock oxidation pond.

This bioreactor model can be used to further investigate oxidation ponds. A public awareness campaign was initiated by the author to encourage proper use and disposal of antibiotics, as flushing them is a common practice in the United States . A cost-effective technique is also needed to inactivate antibiotic-resistant bacteria and remove the antibiotics in oxidation ponds.

Back to Authors
Back to Titles

Kunal Mitra
The Impact of Indian-Americans in a Georgia Congressional District

Minority politics unarguably play a role in U.S. elections and representation, as evidenced by the courting of African-American and Jewish voters in times of election and the activism of minority interest groups on political issues. The Indian-American community in the U.S. though has only begun to use its political voice or organize a united approach to politics as other minority interest groups have. Obstacles that this minority ethnic group must face in exercising political influence include its small numbers, divided factions within those numbers, and presently a lack of significant historical precedent as to how the group should maneuver to pursue political objectives. Indian-Americans have begun to mobilize, however, and in addition to establishing national-level interest groups and voter education centers many local successes have been attained which Indian-American communities throughout the U.S. can seek to emulate. One such example can be found in the 4th district of Georgia, a majority-minority district in which an incumbent Democratic candidate Cynthia McKinney lost in the primary against Denise Majette, the latter having the support of the Indian-American community in the area. Although other organizations and voting groups are credited for the victory of Congresswoman Majette, Indian-American supporters demonstrated a unified effort and an early, organized response in the competition which indicates the continuing maturation of Indian-American politics. This new activism and organized fundraising within 4th district has caused political actors such as Congresswoman Majette to recognize the importance of this group and represent their interests.

Back to Authors
Back to Titles

Kunal Mitra
Sociocultural Influences on Healthcare in Kenya

The societal character and the numerous cultural influences that color the citizenry of Kenya make a powerful impact on the structure and efficacy of public healthcare systems in the nation. In dealing with public health issues ranging from family planning to malaria and tuberculosis epidemics, public officials must carefully choose their strategies in order to harmonize with the sociocultural environment while carrying out the task in question. This study observes the impact of various components of the sociocultural atmosphere, including tribal culture and taboos, the influences of colonialism, the arrival of new ethnicities, and religious belief, on the workings of Kenyan public sector health programs. Through participant observation in community medicine and health education programs and via personal interview of health agency officials, medical doctors, and rural health workers, the sociocultural environments throughout Kenya are analyzed and evaluated in terms of the implications for success of various public health initiatives. Continuing to research these influences on the healthcare infrastructure and efficacy will allow Kenyan health officials to better confront the massive public health problems that face the nation today. A better understanding of the sociocultural milieu will allow more effective programs to be designed which do not clash against, but rather fit with and persuasively transform when necessary, the outlook and beliefs of citizens targeted by public health initiatives.

Back to Authors
Back to Titles

Joseph Moore and Crystal Oliver
Microarray analysis of 100M and 58M Sorghum bicolor cultivated under variable light stimuli.
Dr. Lee H. Pratt

In plants, the perception of light and shade is mediated by the phytochrome photoreceptor system. Th phytochrome molecule exists in two interconvertible forms, red light absorbing (Pr) and far-red light absorbing (Pfr) (Furya and Song, 1994). Chlorophyll strongly absorbs red photons, and plant subsequently sense this aspect of light quality. Recently, phytochrome deficient mutants have been recognized as powerful tools in the assignment of the individual function of each member of the phytochrome photoreceptor system, as well as genes that are potentially involved in downstream signaling mechanisms and physiological molecular responses (Correll *et al.* , 2003). Our project seeks to characterize the differential gene expression between wild type and phytochrome B-deficient *Sorghum bicolor*. Sorghum strains 100M (wild type) and 58M (phytochrome B-deficient) are nearly isogenic. Both were grown under light and dark conditions to determine if a mutation in the phytochrome B receptor affects a plant's perception and responses to a given light stimulus. RNA microarray technology has been employed to produce gene expression profiles of the mutant and wild-type sorghum. By analyzing this data using bioinformatics software (Spotfire: http://www.spotfire.com/) we hope to determine the effect of mutant phytochrome B, and its associated receptor genes, on a plant's light responses and growth.

Back to Authors
Back to Titles

Ashley Neary
Diagnosis of Equine Fungal Keratitis Using Polymerase Chain Reaction
Dr. Susan Sanchez, Department of Medical Microbiology and Parasitology, College of Veterinary Medicine, University of Georgia

Currently cytology, culture, and histopathology are the only diagnostic methods available to identify fungal pathogens associated with keratomycosis (G. *keras* = cornea + *myk e s* = fungus). The purpose of this study was to evaluate polymerase chain reaction (PCR) as a method for early and rapid detection of equine fungal keratitis. The yeasts *Candida albicans* and *Cryptococcus neoformans*, and the filamentous fungi *Aspergillus* , *Cladosporium* , *Fusarium* , and *Penicillium* were used to evaluate universal primers. Genus specific primers were tested against *Candida albicans* (ATCC 10231), and *Aspergillus* and *Fusarium* isolates . PCR using universal fungal primers targeting the conserved regions of ITS1 and ITS2 and genus specific primers were performed on 22 cases of equine keratitis. Fungal PCR (n=22) results were compared to those of corneal cytology (n= 22), fungal cultures (n= 22), and histopathology (n=16). PCR results were positive for universal fungal primers or genus specific primers in 81.8% (n=18/22). Corneal cytology was positive for fungal hyphae in 63.6% (n=14/22). Fungal cultures were positive in 50.0% (n=11/22). Histopathology confirmed the presence of fungi in 43.8 % (n=7/16). Of the 15 cases positively identified with fungal organisms by cytology, fungal culture, or histopathology, 86.7% (n=13/15) were positive by PCR. Of the 7 samples negative for fungal organisms by cytology, fungal culture, and histopathology, 71.4% (n=5/7) were positive by PCR. Of these five cases, four were clinically agreeable with fungal keratitis [stromal abscess (n=3) and deep progressive corneal ulceration (n=1)]. When used in conjunction with cytology, culture, and histopathology, PCR with universal and genus specific fungal primers is a promising tool to aid in the diagnosis of equine fungal keratitis.

Back to Authors
Back to Titles

Ngozi Ogbuehi
Comparing Apoptosis During Different Stages of Limb Development in Chick Embryos
Mary Alice Smith, PhD - Environmental Health Science

Apoptosis, or programmed cell death, is essential in embryonic development and for normal development of

limbs, including deletion of interdigital webs and shaping of limbs. Limb deformities result from too much or too little apoptosis. Using chick embryos as an animal model, our hypotheses were that there is a difference in apoptosis 1) during important stages of limb formation in chick embryos and 2) in the developing fore and hindlimbs. Fertilized eggs were incubated at 37ºC. At the appropriate stage, the embryo was aseptically removed, and fore and hindlimbs were dissected. DNA was extracted using a GeneChoice™ kit. Polymerase Chain Reaction (PCR) was done using a Maxim Biotech TM kit. PCR was used to amplify DNA undergoing apoptosis. PCR results were subjected to gel electrophoresis and the appearance of bands compared to a positive control was used as evidence of apoptosis. The number of PCR cycles was used to quantify the results. The results for stage 25 varied and may reflect differences in populations of cells undergoing apoptosis. More apoptosis occurred at the later stage of development (stage 27) compared to earlier (stage 26), and for stage 27, there was more apoptosis in the hindlimbs than forelimbs. These results suggest that teratogens affecting apoptosis are likely to be more detrimental to the developing limbs during stage 27 and in hindlimbs.

Back to Authors
Back to Titles

Julie W. Orlemanski
CASTING THE SHUTTER: SURREALISM, POLITICS, PHOTOGRAPHY
Dr. Jed Rasula, English Department, University of Georgia, Athens, Georgia, 30602

This paper will examine the Surrealist use of photography and the political role of the photograph as a form of representation within the Surrealist movement. The Surrealist moment is significant in the history of the theory of the photograph because so many critics have looked back to the Surrealists to interpret their legacy in divergent ways – placing emphasis alternately on the Surrealists' critique of representation and their strategic use of representation in conjunction with a debatably Marxist critique of bourgeois society. The paper will include primary texts, mainly from the Surrealists, including British and American artists such as Man Ray, Lee Miller, and Roland Penrose, as well as read seminal works of photographic theory and criticism and notable accounts of Surrealism. The topic of photography is a subject applicable to any engagement with Modernism and modernity, in that the technology of photographic representation is part of a fundamental break in the means of mimetic representation. In addition to engaging the concerns of literary theory and contributing to an understanding of Surrealism and modernity, this paper will specifically look at American and British surrealists and the relation of their Surrealist conceptions of photography to the documentary trends popular in the USA and UK. By centering my paper on the moment Surrealism and examining photographic theory before, during, and after the Surrealist period, I hope to provide a means for examining the different perspectives on the political role of photographic art.

Back to Authors
Back to Titles

Charles John Paetsch
From whence did Neo-Plasticism Spring?
Supervising faculty: Dr. Thomas Polk, Art History

From the essential planarity of his early naturalistic landscapes to the pure abstractions of his final two decades, the corpus of Dutch Modernist painter Piet Mondrian's work follows such a clear path that traces of his final work can be found in each progression of style. This evolution was primarily propelled by his motto "always forward." The accepted hypothesis seems to be that each transition came about by a revelation in form which enabled him to articulate better the theosophical ideas of Helena Blavatsky which enthralled him from his early years. This gradual development theory seems to be true superficially; however, there is significant evidence, specifically in his own essay "Natural Reality and Abstract Reality", to suggest that major conceptual shifts came about in sudden upward spurts rather than through the gradual evolution espoused by most. If this is true, their will certainly be major events which spurred his push to higher abstraction. I will first attempt to extract explanations from Hans Jaffe's biographical sketch to determine which biographical, intellectual, or artistic

events, if any, led to each change in form. If however the gradual evolution theory proves to be true, this would mean that his conceptual vision of a pervasive spirit was attained early but was simply not able to be articulated. If this is the case, the research will attempt to illuminate what events and influences allowed him to maintain this conceptual rigidity even while the attempts to express himself were frustrated.

Back to Authors
Back to Titles

Kevin Patrick
Marcus Tullius Cicero's "Pro Archia Poeta": The Poetics of Law in the Roman Republic
Dr. James C. Anderson Jr., Classical Culture, University of Georgia

Reflecting the mounting conflict amidst the militaristic innovation of Cnaeus Pompeius and the oligarchic sentiments of Lucius Licinius Lucullus in 62 B.C.E., the poet Archias, Marcus Tullius Cicero's childhood tutor, faces prosecution based on the tribunal law of Gaius Papius expelling non-Roman citizens. While Cicero's defense of Archias's citizenship depends upon the Lex Julia and the Lex Plautia Papiria, Cicero focuses on Archias's status as a heralded Roman poet. Thus, "Pro Archia Poeta" illuminates Cicero's perceptions regarding the literary foundations of an education and the implications of a political career. By emphasizing notions of glory, honor, and duty in the Roman Republic, "Pro Archia Poeta" establishes the preeminence of literature within a legal education.

Back to Authors
Back to Titles

Melissa Payton
Predictors and Outcomes of Networking Behavior Among Recently Laid Off Employees

Networking is a successful job-search method for attaining reemployment (Wanberg, Kanfer, & Banas, 2000). Despite the fact that there have been many studies examining the effectiveness of networking among the unemployed, little attention has focused on how individuals network. To address this gap in the literature 146 recently unemployed individuals completed a survey regarding how intensely they network as well as the quality of their networks. Participants also provided socio-demographic (i.e., age, race, gender) and personality information. Factor analysis of the networking measure indicated that networking is a multidimensional construct represented by networking intensity, networking breadth, and quality of information obtained from networks. In terms of individual difference factors that might be linked to how one networks, significant findings include a positive relationship between proactive personality and networking intensity (ß=.184, p=.025) as well as a positive relationship found between proactive personality and quality of information (ß=.210, p=.010). In addition, age was found to have a significant curvilinear effect on network breadth; younger and older employees reported less breadth in their networks, whereas middle-aged individuals reported high network breadth. Finally, there was a significant interaction found between proactive personality and age when correlated with each of these two dependent measures. Together, these findings will hopefully lead outplacement services and career counselors to a better understanding of how individuals network and what they can do to modify their behavior so that networking will be successful in leading to reemployment.

Back to Authors
Back to Titles

Lisa Jane Plummer
Mapping of the Yeast Ras Converting Enzyme Active Site
Dr. Walter K. Schmidt, Department of Biochemistry and Molecular Biology, University of Georgia

Rce1p mediates the proteolytic step in the modification of Ras proteins. Because these post translational modifications modulate the biological function of Ras proteins, the inhibition of these modifications has been

viewed as a possible anticancer strategy. The catalytic mechanism of Rce1p is undefined. Protein alignments of Rce1p orthologs from several different species reveal twenty-one conserved residues that are potentially critical to Rce1p catalysis. We hypothesize that residues conserved in the Rce1p family are part of the yet to be identified Rce1p active site and that the active site is on the cytosolic face of Rce1p, which is an endoplasmic reticulum localized membrane protein that is predicted to have multiple membrane spans. Using a site directed mutation approach, we have identified certain invariably conserved histidine and glutamic acid mutations that are essential for Rce1p activity. By contrast, a cysteine and several other conserved residues are not critical for activity. The cysteine mutant in particular challenges a published finding that Rce1p is a cysteine protease. To further support the importance and relevance of the conserved histidine and glutamic acid residues to enzyme function, we have partially mapped the topology of Rce1p. Using a topology reporter, our results support that certain critical amino acids are likely cytosolically disposed and contribute toward the Rce1p active site. We have determined that the first predicted loop and the C-terminus of Rce1p are located in the lumen of the endoplasmic reticulum. We have also determined that the last transmembrane segment and lumenal tail of Rce1p are dispensable for activity.

Back to Authors
Back to Titles

Lauren Popiolek
Effects of endothelin and cyclooxygenase inhibition on canine prostate cancer growth and invasion
Dr. Bruce LeRoy, Pathology, Veterinary Medicine, The University of Georgia

Prostate cancer is very common in American men. Dogs also develop prostate cancer, and are excellent experimental models for studying prostate cancer. Despite research efforts, the growth factors important for canine prostate cancer are still unknown. Dr. LeRoy's laboratory has shown that canine prostate cells produce endothelins, which are critical in the growth of metastatic prostate cancer cells in men. Additionally, other researchers have shown that canine prostate cancer cells produce cyclooxygenases-1 and -2 (COX-1 and COX-2). The goal of this project is to evaluate the effects of an endothelin receptor antagonist (ABT-127) and a cyclooxygenase inhibitor (piroxicam) on the growth and invasion of a canine prostate carcinoma cell line (MAX-1) developed in Dr. LeRoy's laboratory.

Following incubation with vehicle (control) or ABT-127/piroxicam, an MTT assay (Promega) will be used to evaluate the effects on MAX-1 cell proliferation. Effects of inhibitors on cell invasion will be measured using 24-well transwell plates with a polycarbonate membrane (Corning). MAX-1 cells will be loaded in the upper chamber, and vehicle or the inhibitors will be added to the lower chamber of the plate. Cells migrating into the lower chamber will be counted. Each assay will be performed in triplicate. Differences between control and experimental groups will be determined using Student's *t* test (SigmaStat). P values less than 0.05 will be considered significant.

Results of these experiments could demonstrate endothelins and cyclooxygenases are critical for the growth and invasion of canine prostate cancer. This project could also provide valuable insight to the effects of specific growth factor inhibitors and their use as prostate cancer treatments.

Back to Authors
Back to Titles

Katherine Price
Characterization of Chromosomal Integration by Streptomyces Bacteriophages: use in mammalian genetic engineering.
Janet Westpheling, Genetics Department, University of Georgia.

Recombinases (integrases) are enzymes that facilitate exchange between DNA molecules. Integrases derived by *Streptomyces* phages (viruses that infect these bacteria) have been shown to mediate efficient site-specific recombination in mammalian cells. Michele Calos and her colleagues at Stanford University have constructed cloning vectors containing *Streptomyces* bacteriophage integrases and used them to engineer mammalian chromosomes providing a safer nonviral approach to human gene therapy. Vectors containing the attachment sites of phages f C31 and R4 have been shown stably integrate into pseudo attachment sites found on mammalian chromosomes. We have recently isolated and characterized several new temperate phages from *Streptomyces species* and have begun an analysis of the mechanism of phage integration. Putative lysogens were isolated as turbid plaques and tested for the presence of phage by mitomycin C induction. Restriction analysis of released phage confirmed that the lysogens contained the phage used for infection. Libraries of phage DNA are being constructed in non-replicating plasmid vectors to functionally identify the presence of the integrase gene and phage attachment site. Our plans to manipulate these phage components for use in mammalian cell engineering will be discussed.

Back to Authors
Back to Titles

Drew Proser

Kin Recognition in *Drosophila paulistorum*

Kin recognition serves as an inbreeding avoidance mechanism, which is key to maintaining the overall fitness of a species (Hamilton , 1964). It has been demonstrated that *Drosophila paulistorum* , when given a choice, prefer to mate with genetically non-related individuals rather than with siblings (Kim, in press). Further, when non-siblings were raised together, they had reduced sexual activities and consequently avoided mating. In an attempt to further study this kin recognition in *D. paulistorum,* I have investigated 1) whether this recognition is based solely on familiarity with individuals experienced during early development or 2) whether there is a genetic effect on kin recognition utilizing two types of *D. paulistorum,* an old strain maintained in the lab for many generations and a new strain that was recently collected in nature. I raised them in four different treatments; 1) siblings raised apart communally (SRAC), 2) half-siblings raised apart communally (HSRAC), 3) cousins raised apart communally (CRAC), and 4) non-siblings raised apart communally (NSRAC). These groups are only different in their genetic relatedness and they have no prior contact with non-related individuals. In the female choice situations, one female was placed with a sibling male and a half-sibling male (HS tests); one female with a sibling male and a male cousin (C test); one female with a male sibling and a non-sibling male (NS test), respectively, without prior experience of either male. I observed whether the female mated with her sibling or the distantly related male. Current data show that there are no significant differences in mate choice between sibling and individuals who are different in degree of genetic relatedness (c 1 2 =0.03, ns for HS; c 1 2 =0.81, ns for C; c 1 2 =0.00, ns for NS for the old strain; c 1 2 =2.00, ns for HS; c 1 2 =0.76, ns for C; c 1 2 =1.58, ns for NS for the new strain). There were no significant differences in mate choices treatment groups (c 2 2 =0.68 for old strain; c 2 2 =3.97 for new strain). These results support my hypothesis that *Drosophila* kin recognition is based on familiarity acquired during developmental experience rather than genetic relatedness.

Back to Authors
Back to Titles

Jessica Quinlan

Photochemistry of Benzoyl-substituted Ruthenocenes

Photointiators are compounds that intitate chemical reactions upon irradiation with light and are useful in many real-world applications such as optical imaging and light curable coatings or adhesives. Benzoyl-substituted ruthenocene compounds were investigated as anionic photoinitiators for the polymerization of ethyl 2-cyanoacrylate. Placing a benzoyl group on one or both cyclopentadienyl rings of ruthenocene, Ru(?5-C5H5),

causes significant changes in the electronic transitions observed in the uv-vis spectral region. While the parent metallocene displays low-intensity, solvent-insensitive ligand field absorption bands, benzoylruthenocene and 1,1'-dibenzoylruthenocene exhibit bands that are much more intense and sensitive to the solution environment. This behavior has been attributed to the mixing of appreciable metal-to-ligand charge transfer (MLCT) character into the low-energy excited states of the benzoyl-substituted complexes. Resonance Raman spectroscopy was used as an analytical method to probe the nature of the excited state and confirmed this MLCT assignment. Irradiation of 1,1'dibenzoylruthenocene in ethyl 2-cyanoacrylate results in the anionic polymerization of this electrophilic monomer. The kinetics of this photoinitiated process were investigated using total reflectance infrared spectroscopy. Finally, a possible mechanism of this process is proposed and compared with that previously proposed for the analogous ferrocene compounds based on the excited state properties of both compounds.

Back to Authors
Back to Titles

Christopher A. Ratke
Globalization and the Process of Inequality

It is readily apparent to anyone who checks a manufacturing tag, watches the nightly news, or listens to a politician, that the world is in the midst of the era of globalization. Even though the term has become somewhat of a buzzword, especially among politicians, businesspeople and journalists, the effects of globalization are still being scrutinized to better understand what they entail and what they imply. One of the most pressing matters concerning the process of globalization involves the creation or perpetuation of inequalities. These inequalities create classes of winners and losers who unfairly benefit or suffer by participating in the process of globalization. The purpose of my research is to assess empirical data that demonstrates a causal relationship between globalization and various forms of inequality. If one considers globalization as a "supraterritorial" process in which actions taken on a local scale have global implications and vice versa, one can identify inequalities that occur at the international, national, and local level due to globalization. While the world today is in the throws of such a sweeping process, it is vital to understand what is going on around us and why, so that people are not, in a sense, thrown off the "train" of globalization, or simply left behind. At the conclusion of my paper I expect to present a clear relationship between globalization and the generation of inequality and what this relationship implies for the future of this global process.

Back to Authors
Back to Titles

Charles Ratliff
The U.S. Government vs. The National Football League: How the Government Decided to Regulate the League's Television Policy

This paper analyzes the development of the National Football League's (NFL) television policy from 1949 until the Federal Court ruling in 1953 established the parameters for broadcasting NFL games. A central focus will be on investigating why the U. S. government got involved in regulating the NFL's television policy. Four themes will guide the narrative: the NFL's early relationship with television; the factors that led to NFL Commissioner Bert Bell revising the league's television policy; the forces that led to government intervention into the NFL's television policy; and the impact of the 1953 court ruling. Bert Bell's efforts to revise the NFL's television policy coincided with the emergence of the television industry and their attempts to develop their programming niche, and the simultaneous efforts of the US government to regulate the airways. When Bell attempted to regulate NFL broadcasts, the US government viewed this as a violation of the Sherman Antitrust Act. The NFL was found in violation of antitrust laws, but Judge Allan K. Grim allowed the league to blackout home games within a 75-mile radius. Despite this setback, Bell saw this ruling as a victory because the league won its most important point – the blackout of home telecasts.

Back to Authors

Back to Titles

Ryan Rhome
Purification and Caracterization of *BkdR* Protein in *Streptomyces coelicolor*

One of the biggest problems facing medicine today is increasing bacterial resistance to antibiotics. The solution may be found by manipulating the natural product biochemical pathway of *Streptomyces* , a soil organism that produces most of the known antibiotics. In order to use this pathway to create novel antibiotics, it must be fully analyzed because the antibiotics can only be created *in vivo* . Mutations in genes that control the branched chain keto acid dehydrogenase complex (bkd) eliminate antibiotic synthesis; therefore bkd is the first choice for further experimentation. Based on predicted structure of the protein and the activity of known homologous proteins in other species, bkdR is hypothesized to be the regulator of the gene and would therefore be the first step in the full analysis of the pathway. Starting with this proposed regulator protein, the components of the pathway will be assayed for biochemical activity. This possible regulator gene was cloned into a vector using restriction digestion and amplification in *E. coli* cell cultures. The vector is designed to add an amino acid tag to the protein product that will allow easy purification. After this purification, the protein will be categorized for many different activities, including DNA binding studies. Also a complementation study is underway to show that the tagged version of the protein functions normally in vivo. In addition to testing the biochemical properties of bkdR, analysis of promoter mutants can be used to determine what cell signals are used and what other proteins interact with bkdR. These studies would determine the direction and scope of further experiments.

Back to Authors
Back to Titles

Michael H. Robinson
GIS and Field-Based Analysis of the Impacts of Recreational docks on the Saltmarshes of Georgia
Applied Coastal Research Laboratory, Georgia Southern University, 10 Ocean Science Circle, Savannah, GA 31411 and Clark R. Alexander, Skidaway Institute of Oceanography, 10 Ocean Science Circle, Savannah, GA 31411

Population pressure along the Georgia coast has greatly increased the number of docks that extend across the marsh, impacting marsh ecosystems through shading. To understand the patterns and impacts of dock proliferation, aerial photography and field data were used within a geographic information system (GIS) to quantify salt marsh area directly affected by docks. Maps showing the footprint of docks from 1970 to 2000 on Wilmington Island, GA, were created to quantify changes in dock area. These maps document an 89% increase in total dock area and a 74% increase in number of docks during this period. Indicators of shading impacts (e.g., plant height and stem density) were quantified for salt marsh grasses beneath and adjacent to docks from a range of time periods, dock orientations and dock heights. Average vegetation stem density was 50% lower beneath docks than measurements adjacent to docks. This study provides baseline and trend data regarding dock impact and proliferation, provides guidance on potential impacts of docks on estuarine productivity and will be a valuable tool for coastal managers in assessing the cumulative impact of these activities.

Back to Authors
Back to Titles

Sarah E. Sattelmeyer
DATING, MATING, AND PROCREATING: DARWIN IN THE VICTORIAN NOVEL
Richard Menke, Department of English, Franklin College of Arts and Sciences, University of Georgia, 254 Park Hall, Athens, Georgia 30602-6205

Nineteenth-century England was a time and place of scientific exploration and literary innovation, both of

which are blended in Victorian fiction. Victorian novelists took a special interest in the ideas of Charles Darwin, a nineteenth-century naturalist whose work The Origin of Species inspired Herbert Spencer to coin the phrase "survival of the fittest." Victorian novelists often examined the bleeding of evolution into the social sphere of fiction and whether organisms compete and adapt to social as well as physical environments. By definition, evolution is successful if an organism's genes will be passed to the next generation. If an organism also evolves socially, the processes of courtship and marriage make humans "not only animals but cultural animals" that use instinct as well as consciousness and cultural ideas in their sexual selection (Dickens 16).

This paper explores the relationship between Darwin's theory of evolution and the evolutionary process and the social realm of the Victorian novel. Characters and events from Jane Austen's Sense and Sensibility through George Eliot's Daniel Deronda portray popular Victorian sentiments. These sentiments range from feelings about the "pre-Darwinian" thought of Lamarck and Erasmus Darwin to Charles Darwin's The Origin of Species and provide a window into how Darwin's subsequent theory of evolution impacted Victorian society.

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Back to Authors
Back to Titles

Kristen Scarbrough
Development and Improvement of Assays for the Early Detection of Cancer
Dr. J. David Puett, Department of Biochemistry and Molecular Biology, University of Georgia

Trophoblastic malignancies such as choriocarcinoma have been associated with the production and secretion of hyperglycosylated isoforms of the pregnancy hormone, human chorionic gonadotropin (hCG). The identification of such glycoproteins is becoming increasingly important in the development and improvement of tumor marker assays and key in the early diagnosis of cancer. Currently, this research project is primarily focusing on the analysis of pregnancy-derived hCG isoforms and their potential discrimination from trophoblastic malignancy-derived hCG. Thirteen pregnancy urine samples were obtained from patients at the Athens Women's Clinic and analyzed on the BIAcore to determine the concentration of hCG in each urine sample, as well as the various hCG glycosylation isoforms. In this assay, hCG is captured by a modified monoclonal antibody and then probed with various lectins, i.e. carbohydrate-binding proteins. The identification of the different hCG isoforms was performed by injecting several types of lectins, including *aleuria aurantia lectin* (AAL), *galanthus nivalis lectin* (GNA), and *sambucus nigra lectin* (SNA), on the BIAcore after every urine injection. The data gathered from these and other experiments with urine from cancer patients will be used in the development of assays for the early detection of cancer. Even though this research project is currently exploring hyperglycosylated hCG isoforms as potential tumor markers, the project will expand to include the investigation of glycoforms of PSA, CEA and CA-125 as tumor markers. Serum and urine samples from patients with a variety of cancers will be analyzed on instruments such as the BIAcore and the Immulite, which use surface plasmon resonance and fluorescence-based assays, respectively, to detect tumor marker proteins with aberrant glycosylation patterns.

Back to Authors
Back to Titles

Jeffrey R. Seay
Functional analysis of Ubc2, a putative novel adapter protein in *Ustilago maydis*
Dr. Scott E. Gold, Department of Plant Pathology

The fungus *Ustilago maydis* is the causal agent of corn smut. This fungus alternates between a haploid, budding

saprophytic form found in the soil and a pathogenic filamentous form that invades corn tissue. The *ubc2* gene encodes a protein involved in the MAP kinase pathway controlling mating and morphogenesis . *Ubc2* is a critical virulence factor that encodes a protein possessing four protein interaction domains. Site-directed mutagenesis and complementation studies indicated that certain amino acids within the Sterile-Alpha-Motif and Ras association domains are critical for complementation and hence Ubc2 function. The yeast two-hybrid assay was employed with *Ubc2* as bait to identify interactions between Ubc2 and other proteins in the MAP kinase pathway. Targeted two-hybrid studies revealed that Ubc2 interacts with Ubc4 MAPKK Kinase and that SAM domains at the N-termini of the Ubc2 and Ubc4 proteins mediate this interaction. These results contribute to the overall understanding of morphogenesis in Ustilago.

Back to Authors
Back to Titles

Amy Sexauer, Daniel J. King, Bruce Seal, Ivomar Oldoni, and Corrie Brown
Immunohistochemical detection of various recombinant Newcastle disease virus strains in embryonated chicken eggs

Newcastle disease (ND) is a poultry disease caused by strains of Newcastle disease virus (NDV), a member of the genus Avulavirus, family Paramyxoviridae. The presence of ND must be reported to the Office International des Epizooties, resulting in financially damaging trade embargos. NDV isolates are typically classified on a scale ranging from least virulent (lentogenic) to most virulent (velogenic). In this study, four viral strains were used: rLa Sota (infectious clone of the lentogenic La Sota strain), rBC (infectious clone of velogenic Beaudette C strain), rLa Sota with BC HN (rLa Sota with virulent BC hemagglutinin-neuraminidase (HN) gene insert), and rBC with La Sota HN (rBC with lentogenic La Sota HN gene insert). Four groups of nine-day-old White Leghorn embryonated eggs were inoculated with the four viral strains, and at 24, 48, and 72 hours post infection both embryo tissues and chorioallantoic membrane (CAM) were harvested from each egg. Tissues were examined immunohistochemically using an antibody to a NDV protein. Embryos infected with rLa Sota had viral protein only in epithelial cells of the CAM. Embryos infected with rLa Sota with BC HN had viral protein found in CAM epithelium, subepithelial cells, and some embryonic tissues. Both embryos infected with rBC and rBC with La Sota HN demonstrated viral protein in CAM epithelium, subepithelial cells, and in embryonic tissue. It can be concluded that in the embryo, the presence of the virulent HN gene is not necessary for extensive tissue invasion and dissemination of the virus.

Back to Authors
Back to Titles

Katherine Sheriff
Georgia's Water Wars: Are Permit Transfers Sound Water Policy?

Decades of population and economic growth exaggerated the existing strain on Georgia's water resources. The purpose of this research was to examine legislation in the 2003 legislative session, specifically, the policy of transferring water permits. House Bill 237 included the controversial strategy of legitimizing water permit transfers in which a person or entity that presently has a permit would be allowed to transfer or to sell rights to some, or all, of the capacity under the existing permit.

Qualitative, primary research was conducted predominantly through interviews with the Georgia legislature and involved lobbyists as well as the attendance of Senate Natural Resources Committee meetings during the 2003 legislative session. Interviews provided differing views to assess the potential effects of permit transfers. Through this analysis, conclusions were drawn as to the possible benefits or costs of allowing permit transfers in Georgia.

Even though concerns of possible problems associated with permit transfers sparked much debate, the most significant argument is whether water rights belong to the public or could be marketed as a private commodity.

After thorough analysis of an array of relevant ideas and arguments, I conclude that, in a capitalist society, markets are the key to economic freedom and represent the economic philosophy of the United States. Creating a market for permit transfers would further economic progress while allocating water to those users who could no longer get permits.

Back to Authors
Back to Titles

Katherine Sheriff
Negative Campaigning in the Georgia 2002 Elections: An Analysis of Scholarly Research in the Context of Real Campaigns

Negative campaigning changed the face of Georgia politics throughout the last twenty years. Due to the public policy implications and increasing frequency of negative advertising as an attack vehicle, scholars engaged in research studying different areas of negative advertising. The purpose of this research is to examine selected 2002 Georgia elections and review specific scholarly studies to determine the effects of attack advertising in the context of real campaigns. Although quantitative data such as election results enriched the research, this study is based primarily on qualitative research derived from personal interviews, newspaper sources, relevant scholarly literature, campaign materials, and advertisements. The examined elections included the Governor's race between Roy Barnes and Sonny Perdue, the State Senate race between Doug Haines and Brian Kemp, the State Senate Primary race between Joyce Stevens and Renee Unterman, and the U.S. Senate race between Max Cleland and Saxby Chambliss. Results show that the use of negative campaigning is increasing and that the characteristics of candidates most likely to use attack advertising in Georgia campaigns are consistent in real campaigns. Findings from scholarly research are demonstrated, specifically, negative advertisements are highly effective during campaigns and seem to lead to electoral victories. Likewise, the traditional view that extreme negativity in advertisements could yield negative effects on the sponsor is disproved due to the phenomena of the sleeper effect which depletes any backlash to the source without diminishing the negative message. These findings create interesting positions for future candidates, the public, and the media.

Back to Authors
Back to Titles

Irene Shtrulis
Recovering Self

Recovering Self, written as an undergraduate honors thesis in creative writing, consists of two parts. The first part entitled "Writing to Permeate Cultural Borders: Analysis of *Mango Street*" reviews and analyzes the themes and composition of The House on Mango Street, authored by Sandra Cisneros, and serves as the introduction to the ensuing collection of short stories. It also focuses on multicultural individuals' ability to serve as intercultural mediators, or liaisons among different groups, through writing and rhetoric. The second part of the thesis consists of a collection of short stories, or vignettes that are subdivided into three logical sections: Departure, Arrival, Recovery; the stories are original pieces that focus on a young immigrant's memories and her search for identity. This search for identity delves into the young girl's past and implicitly reconstructs her life through the readers' eyes. Throughout the work, the search for identity is an active process as it presents situations to which readers can relate or empathize with. The stories, while written in a unique style, were inspired by Cisneros's composite novel. Thus, Recovering Self echoes the themes and mimics the format of The House on Mango Street. The overall theme of the entire work lies in its multicultural appeal. Both the critical review and the actual vignette collection deal with the notion of being an intercultural mediator, a role in which one produces work that will increase knowledge and understanding between different ethnic groups through the human ability to relate to similar events in life.

Back to Authors
Back to Titles

Michael Smilley
Sulfur Isotope Analysis of Alteration Minerals in Balekasir area, Northwest Turkey
Dr. Paul A. Schroeder, Geology, University of Georgia

Halloysite is an economically important kaolin group clay mineral used widely in the ceramics industry. As part of a study to understand the viable extent of this natural resource in northwest Turkey, samples were collected in March, 2003 near Turplu in the Balekesir region. The purpose of this study is to characterize mineralogical and chemical properties of the deposits using X-ray diffraction and stable isotope analysis. Alunite, halloysite, gypsum, quartz, plagioclase, and pyrite were found to be the dominant phases. Sulfur was extracted from alteration minerals for the isotope analysis using a combustion method. A gas-source mass spectrometer was then used to quantify the ratio of 34 S to 32 S (i.e., d 34 S values) within each sample.

Alunite samples, when compared to coexisting pyrite, were greatly enriched in 34 S while other alteration minerals were only slightly enriched in 34 S. Analysis yielded a d 34 S Pyrite value of 0.64 and alunite, gypsum and jarosite d 34 S values of 7.81, 2.99 and 2.61. When compared to values from other hydrothermal systems around the world, these data suggest a mixed origin of rock altering sulfuric acid in the system. Through study of the alteration minerals the mode of genesis of the deposit is now better defined. This is important because it indicates that the extent of the halloysite deposit has the potential for future economic sustenance in the region.

Back to Authors
Back to Titles

Angelique Smith, Mary Washington, Nasreen Bano, and Tim Hollibaugh
Microbial Diversity of Sediment in Mono Lake, California
Department of Marine Sciences, University of Georgia, Athens, Georgia 30602

Mono Lake is an alkaline (pH 9.8), hypersaline (salinity >80ppt), closed basin lake located in central California. Extreme environments, such as Mono Lake, contain many unique microbes. Recent studies have shown that 75% of the 16S rRNA sequences recovered from Mono Lake water clone libraries were distinct at the genus level or higher when compared to known sequences. There is not much known about the microbes inhabiting Mono Lake sediment. We analyzed the microbial diversity in a sediment core (2 cm to 45 cm below sediment surface) collected from station 6 at Mono Lake during August 2002. Denaturing Gradient Gel Electrophoresis (DGGE) and 16S rRNA clone libraries were used to examine microbial community diversity. DGGE fingerprinting showed differences in banding patterns between depths. 16S rRNA clone libraries were constructed from samples taken at 15cm and 24cm of the 2002 core. A total of 14 clones from 15cm and 22 clones from 24 cm were analyzed. The 15 cm clone library was dominated (23%) by Picocystis chloroplast sequences, whereas the 24 cm clone library was dominated (50%) by a Synechococcus-like cyanobacteria. The other major group (23 and 18%, respectively) found in both clone libraries was related to low G+C-Gram-positive bacteria which is also found in Mono Lake deep water. Other sequences found were related to ?????? and ?-Proteobacteria, CFB, Verrucomicrobiales, and candidate divisions. Ongoing work is focused on analyzing the microbial diversity of a 2003 sediment core. Our results concluded that Mono Lake sediment contains some unique microbes. Other sediment microbes were similar to those found in the overlying water. This study will provide a better understanding of the structure of microbial communities in salt lake sediment.

Back to Authors
Back to Titles

Solomon B, Wilson M, Dozier S, McCully K.
Internal Muscle Architecture During Isometric Contractions of the Quadriceps Muscle with Varying Force.

Exercise Science Department, University of Georgia, Athens, GA 30601.

Many explanations of muscle characteristics in humans are explained by external movement; however, a closer look at internal measurements may provide a better understanding of these characteristics. The purpose of this study was to quantify internal movement during isometric contractions at varying force levels.

METHODS: Six healthy young (20 – 28 years old) males were tested on two different days. The subjects preformed voluntary isometric contractions of the quadriceps muscle with 70 degrees flexion. B-mode ultrasound images of the vastus lateralis were taken at 10, 20, 30, 40, and 50 percent of MVC. Images were analyzed for muscle thickness, pennation angles, fascicle length, and excursion of a central tendon during the contraction. **RESULTS:** At rest pennation angle was 14.8 ± 2.2 o , muscle thickness was 2.69 ± 0.39 cm, and calculated fascicle length was 10.6 ± 1.3 cm (mean ± SD). With increasing force, angle increased (R 2 =0.987), muscle thickness decreased (R 2 =0.857), fascicle length decreased (R 2 =0.864), and excursion increased (R 2 =0.987). Excursion of the central tendon varied from 0.63 ± 0.95cm at 10% MVC to 2.25 ± 0.21 cm at 50% MVC. Excursion had the lowest coefficient of variation (on average 15%). **DISCUSSION:** To our knowledge, this study was the first to measure internal architecture responses to isometric contractions. Excursion of the central tendon had the largest effect size and best reproducibility. The coefficients of variation that we measured were higher than similar ultrasound measurements by other investigators. If the coefficient of variation can be reduced, these measurements may be useful for the study of muscle function in age and disease.

Back to Authors
Back to Titles

Christopher Stokes
Child Mental Health and Academic Achievement

Child mental health is correlated with academic achievement in elementary school, yet the reasons for this relationship are not known (Veldman & Worsham, 2001). Temperament theory suggests that two components of mental health, attentional control and impulsivity are the active ingredients that either promote or interfere with academic achievement. Attentional control is the ability to orient, sustain, and shift attention; attentional control allows children to regulate their internal arousal. Impulsivity refers to the ability to regulate behaviors related to internal arousal and is exemplified by hyperactive behaviors such as interrupting others and excessive talking (Posner & Rothbart, 2000). We investigated these constructs in a sample of 38 first through fifth grade children by forming two groups of children, moderate behavior problems versus few behavior problems, based on teacher ratings from the prior academic year. We then collected detailed classroom observations of attentional control and hyperactivity/impulsivity behaviors for these same children on several occasions during the 2002/2003 academic year. We found that the moderate behavior problem group displayed significantly more attentional control problems in the classroom, a finding that is consistent with predictions that this variable is important for academic achievement in the classroom. There children also had less favorable academic interactions with teachers. We found, however, that children with few behavior problems were actually more hyperactive in the classroom than the moderate behavior problem group. These findings support the proposition that attentional control, and not impulsivity, is more likely to be an active causal ingredient for academic problems for young children.

Back to Authors
Back to Titles

Dana Swanson
Gender in Improvisational Comedy
Dr. Allen Partridge, Department of Drama and Theater, University of Georgia

Since Viola Spolin compiled the essentials of games, storytelling, folk dance, and dramatics in her 1963 Improvisation for the Theater , both women and men have actively participated in the humorous art of theatrical improvisational comedy. However, as both a comedic improviser and an audience member myself, I was curious if male and female improvisers experience gender inequality in this unscripted art form that was founded by a woman. Socialization often encourages the feminine gender—the gender from which improvisational theater and comedy initiated—to embrace passivity and a reserved nature whereas it encourages the masculine gender to celebrate aggressiveness and a more intense willingness to take risks. Thus, our culture's socialization standards are more conducive to males taking a on-stage lead in this craft. Through academic research in improvisational theory, interviews with improvisers, participation in improvisation, and observation and data collection of improvised scenes and both player interactions and audience reactions, I have found that both sexes often possess performance styles reflecting their corresponding gender socialization. However, specific gender-inclusive improvisational training, exercises, and games make players conscious of this socialization, allowing for a more gender-friendly playing ground during both practice and performance.

Back to Authors
Back to Titles

Candace Thompson
Girls in the System

Historically speaking, females made up just a small part of the total of juvenile crimes. Although juvenile arrests are declining in general, female juvenile arrest rates remain fairly constant. Contrary to the overall declining juvenile crime rate, the adult female crime rate is on the rise. It is evident that these issues must be dealt with before these young women grow into delinquent adults. This project will present a brief historical analysis on female criminals, and also current statistics about females in the juvenile justice system, including how they go through the system of "cops, courts, and corrections." Exploring the inequality of treatment of young women in the justice system will expose a gender bias. The process from arrest to conviction is explained. The pros and cons of the current practices are evaluated and addressed. Suggestions for future changes and improvements in the system are made.

Back to Authors
Back to Titles

Tracey Troutman
Early Chick Nutrition: Development of Pre-starter diets
Dr. Amy B. Batal

Immediately after hatch the young broiler chick is forced to rapidly switch from nutrients of endogenous sources (mainly from yolk lipids) to nutrients of exogenous sources (diet). The gastrointestinal tract is also increasing in weight faster than the chick's body weight. Thus, optimal nutrition during the first 4 to 7 days posthatching is crucial to ensure that chicks get off to a good start and are able to great their genetic potential. One way to achieve optimum nutritional benefits during this early period is to develop a pre-starter diet that would be fed for the first 4 to 7 days posthatching. The first step to developing an effective pre-starter diet is to determine the optimal nutrient levels required during the first 4 to 7 days posthatching. By studying the requirements of specific nutrients such as lysine and the sulfur amino acids (methionine and cystine) we will be able to formulate diets that provide chicks with the necessary nutritional balance during this crucial period of development. In Experiment 1 five levels of lysine (0.75 to 1.15% of the diet) were fed for the first 5 days posthatching. Growth performance did not plateau or reach a maximum suggesting that the requirement is greater than or near 1.15% lysine. This study suggests that the lysine requirement of chicks during the first 7 week posthatching is much higher than is currently reported. Additionally, preliminary experiments show a significant increase in weight gain from 0-21 days in diets enriched with 15% plasma. To further test the requirements for lysine and the sulfur amino acids two additional experiments are currently being conducted with emphasis placed on requirements for the first 4 days of age.

Back to Authors
Back to Titles

Jonas Vanags
Immunomodulatory activity of saliva from the lone star tick, Amblyomma americanum

The lone star tick, *Amblyomma americanum,* is the disease vector for human monocytic ehrlichiosis. Previous investigations suggest that ticks down-regulate host hemostatic and immune system components with saliva to obtain an adequate blood meal. Inadvertently, however, the modulation of host responses may facilitate pathogen transmission. Through a series of *in vitro* assays using a mouse as a model for the human, we have found evidence supporting a similar function for *A. americanum* saliva. Proliferation assays revealed significant dose-dependent inhibition in mitogen stimulated T- and B-cells and in antigen (OVA)-stimulated T-cells from a transgenic host. Two trends of cytokine secretion, measured with the Bioplex system, were found in response to OVA peptide. Inflammatory and Th1 cytokines showed dose-dependent inhibition, while Th2 cytokines were stimulated at low levels of salivary gland extract and inhibited as doses increased. This evidence suggests that the host immune system is pushed toward a Th2 response. HPLC analysis and proliferation assays of HPLC fractions have shown evidence of inhibitory proteins. Work to further purify and characterize these proteins is planned. Identification and characterization of inhibitory proteins may lead to the understanding of the mechanisms of disease transmission and possible disease prevention.

Back to Authors
Back to Titles

Rachel Votta
Hahaha, : -), * Falling down laughing *: Expression of Amusement in a Computer-Mediated Community of Practice, an Ethnographic Approach

Members of a computer-mediated discourse community are faced with challenges when attempting to supplement conversational cues, especially emotional cues, not readily transmissible through the computer screen. Online speakers have developed methods for compensating that include ideographs of facial expressions, orthographic representations of non-speech sounds, and written notation that represents action. This paper takes an ethnographic approach toa small computer-mediated community that congregates on LiveJournal, an online weblogging program, and explores the community's choices for expressing amusement. The community members — all women — employ a variety of methods for expressing amusement, however they make stylistic choices for which method to use at which time. These stylistic choices, such as the tendency to use asterisk emoting (ex. *laughs*) or orthographic representation (ex. Hahaha) instead of emoticons, hold meaning and status within their community. The women's choices display the inherent variation in human language, both individually and as a community. These choices is emoting can tell researches much, not only about the specific community, but about language and communities of practice in general.

Back to Authors
Back to Titles

Wakefield, Ballew, and Klosson
An Examination of Gender and Age factors in relation to Preschoolers' Aggression

Aggressive behavior among children has fueled a great deal of today's academic research. With the prevalence of violence in schools, researchers are asking questions about the source and implications behind the increase of aggressive behaviors in youth. Studies have suggested that the development of aggressive behavior begins at an early age. Gender differences in aggression have also been identified, with males exhibiting more physical

aggression than females. In the present study, ninety-six preschoolers (54 boys) ranging from 38 months to 62 months (Mean age = 48.34 months, SD = 6.9 months) were recruited from a neighborhood day school and the same county's Head Start program. Two age groups (3-year olds and 4-year olds) were further divided based on their classroom compositions. Fifty-seven 3-year olds (31 boys, mean age 46 months and 26 girls, mean age 47 months) provided age and gender comparisons. This study is a part of a larger study by Chiang collected during the year 2000-2003. All children were randomly assigned into a triad group to participate in two structured plays where one standard toy was provided and a free play session. Children's behaviors were video recorded and coded by semi-blind researchers. Teachers and parents were asked to rate children's behaviors using Social Competence Behavioral Check Evaluation (SCBE: LaFreniere & Dumas, 1995). MANOVA results showed more differences in age factor than in gender factor. Four year olds were more apt to display aggressive behaviors through play and teachers' ratings. Implications will be discussed at the conference.

Back to Authors
Back to Titles

Daniel White

Survey Of public Health-Related Activities at the University of Georgia

The mission of public health as defined by the Institute of Medicine is to "fulfill society's interest in assuring conditions in which people can be healthy." Public health carries out its mission through organized, interdisciplinary efforts that address the physical, mental and environmental health concerns of communities and populations at risk for disease and injury. For this project a survey was carried out to identify public health related courses, research projects and public services and outreach projects at the University of Georgia. The online course description section of the UGA bulletin was read to identify public health related courses. The funded research projects section of The 2002 OVPR Annual Report was used to identify public health related research projects, and the various web sites of the offices of public service and outreach were used to find PS&O projects that were significant to this research. The public health related courses and projects identified through this research will be used to make a database outlining all public health activities ongoing at the University of Georgia. The information from this database will be used to create a framework to support the foundation of a School of Public Health at UGA. With nearly $19 million funding public health related research projects and over eighty public health related courses being offered on campus, the University of Georgia is well on its way to meeting the criteria necessary to open a school of public health.

Back to Authors
Back to Titles

Cale D Whitworth

AN INTEGRATED ANALYSIS OF A CHEMICAL REACTION NETWORK FOR THE METABOLISM OF QUINIC ACID IN *NEUROSPORA CRASSA*

Dr. Jonathan Arnold, Department of Genetics, University of Georgia, Athens, Georgia 30602

A chemical reaction network for the metabolism of Quinic Acid in *Neurospora crassa* has been proposed. In this reaction network two regulatory genes and five structural genes are responsible for the metabolism of Quinic Acid. The protein product of *qa* -1F transcriptionally controls the expression of all seven *qa* genes, including those encoding enzymes which utilize Quinic Acid as a carbon source, and the protein product, QA-1S, represses the activator protein, QA-1F. An ensemble of possible chemical reaction networks is developed with rate constants consistent with RNA and protein profiling data. An alternative network, in which several molecules of QA-1F (i.e. Hill coefficient is greater than one) cooperatively activate *qa* genes, is also developed.

Back to Authors
Back to Titles

Lauran E. Whitworth
Elliott Daingerfield's *Tanagra* and the Cultural Tension of Fin de Siècle America
Dr. Janice Simon, Department of Art History, Lamar Dodd School of Art, University of Georgia

The American fin de siècle (1876-1913) was an age of decadence, enlightenment, progress, and cultural revolutions; yet, it was also an era of polarities and contradictions with factions of modern culture simultaneously neglecting and appropriating antiquity. Henry James wrote (1888), "we are divided of course between liking to feel the past strange and liking to feel it familiar; the difficulty is, for intensity, to catch it at the moment when the scales of balance hang with the right evenness." Elliott Daingerfield's Tanagra (also called Contemplation, 1901, o/c) demonstrates this amalgam of what James deems "evenness" between the past and the present. In his use of the Tanagra figurine, Daingerfield (1859-1932) not only merges modern culture with classical influences but also combines stylistic elements of Orientalism and Symbolism, as well as introducing thematic notions of introspection, memory, and spirituality. Daingerfield's Tanagra stands out as a painting of pathos, reflecting not only the demeanor of the female subject, but also the atmosphere of turn-of-the-century America. I contend that Daingerfield's Tanagra embodies a culture in crisis, an America struggling to define itself amidst the many facets and fragments of foreign influences and modern trends. Thus, in its synthesis of classical and eastern aesthetics, it attempts to assuage a distinctly American anxiety. As I will demonstrate, Daingerfield's Tanagra, in fact, represents one of the best efforts at national identification and cultural clarity by one of America's most overlooked painters.

Back to Authors
Back to Titles

Meghan Wilson
Phylogenetic and Functional Analysis of Pax6 Regulatory Elements
Dr. Jim Lauderdale, Department of Cellular Biology, University of Georgia

The Pax6 transcription factor is required for several aspects of brain development, including regionalization of the neural tube and specification of several types of neurons. Mutations in *Pax6* cause a loss of forebrain structures and misspecification of neurons. However, little is known about the regulation of Pax6 and its mechanism of function in the developing brain. To study the function of Pax6 in the developing forebrain, I have taken a comparative approach using mammals and zebrafish. In zebrafish, the control elements have been divided among two similar transcription units. We have shown, in zebrafish, that one *Pax6* gene gives expression in the neuroepithelium throughout the telencephalon while the other *Pax6* gene gives expression in specific neurons. I hypothesized that I can separate these two control elements in the single mammalian *Pax6* gene. We have shown in transgenic mice that the region upstream of the human P 1 promoter contains the control elements responsible for expression in the forebrain, metencephalon, and spinal cord. I analyzed the expression domain of the control elements in this region upstream of the P 1 promoter by microinjecting the promoter region construct into zebrafish embryos, making them transiently transgenic. After 24 hours of development, I analyzed the reporter expression by creating an accumulated expression map and have shown that the region does give expression in both the neuroepithelium and in specific neurons. Finally, I performed a deletion analysis of the fragment to identify the discrete regions responsible for expression in either the neuroepithelium or the developing neurons.

Back to Authors
Back to Titles

Ryan Wilson
The Italian hill town as a model for United States urban redevelopment

The irregular layout of Italian public space is a poignant example of the adaptability to modern occurrences that is possible with minimal public governance and an increased public respect for the prospect of symbiosis

between human transportation modes within confined urban spaces. The United States and its inhabitants, on the other hand, now face an epidemic of poorly designed and maintained urban spaces that do not reflect the fluidity present in historically pedestrian Italian cities, which prohibits a symbiotic interaction between all street-level modes of human transportation. The observations gathered while monitoring this fluid daily life of the Italian piazza suggests that the wax and wane of pedestrian and mechanized traffic is a result of not only a delineated structure of allowable uses, but also an inherent realization of the importance by the populace that both forms of traffic play a necessary role in the functioning of the modern economy and society. In addition, the extraneous open space in Italian piazzas may be appropriated by a palpitating public forum of cafes and special events that serve as economic incentives to maintaining the multi-functionality of the piazza. The United States can greatly benefit by utilizing the design adaptability of Italian public space that has originated over thousands of years of intuitive and functional building layout, to redevelop a rich and concise fabric of urban public space.

Back to Authors
Back to Titles

Thomas Wood
The Role of CaaX Proteolysis in CaaX Protein Function
Dr. Walter K. Schmidt

Post-translational modification can be a very important step to the function of proteins. Certain proteins with a C-terminal amino acid sequence of cysteine (C), any two aliphatic amino acids (AA), and any amino acid (X) undergo a post-translational modification, referred to as CAAX processing. The human protein Ras undergoes CAAX processing. Understanding the CAAX modification pathway may therefore be useful for identifying methods that can regulate Ras hyperactivity that is typically associated with cellular transformation. Two proteases have been identified that are integral to CAAX processing in *Saccharomyces cerevisiae* . However, the specific characteristics of these CAAX proteases, Ste24p and Rce1p, are largely unknown. This study is focused on evaluating the physiological importance of CAAX proteolysis. We are testing the hypothesis that CAAX protein stability is altered in the absence of proper CAAX processing. We have found that the steady state levels of Ydj1p and Pex19p are reduced in yeast backgrounds lacking Ste24p. A prediction of our model is the alteration of the Ydj1p CAAX motif to an Rce1p-specific motif would correspondingly result in decreased levels in the Rce1p-deficient background. When such a Ydj1p mutant is evaluated, we find that levels are not reduced. Moreover, levels of Ras2p and **a** -factor are also not reduced in any protease-deficient background, suggesting that our hypothesis may only be valid for some CAAX proteins. Combined, our data suggests that CAAX proteolysis is essential for proper protein expression of Ydj1p and Pex19p, but that the protein levels of other CAAX proteins are not affected by CAAX proteolysis. This study implies that inhibitors of Rce1p and Ste24p may not affect the function of all CAAX proteins.

Back to Authors
Back to Titles

Kristine Yu
Studies on transgenic mice expressing a constitutively active luteinizing hormone receptor
Dr. Prema Narayan, Department of Biochemistry and molecular Giology, University of Georgia

The luteinizing hormone receptor (LHR) is a G protein-coupled receptor whose activity is regulated by luteinizing hormone and human chorionic gonadotropin. This receptor is essential in mammalian reproduction. A number of naturally occurring activating mutations in LHR cause precocious puberty, a disorder characterized by prepubertal increases in testosterone synthesis. To study the effects of chronic LHR activation *in vivo* , transgenic mice expressing a genetically engineered constitutively active yoked hormone receptor (YHR) were previously generated. YHR was constructed by covalently attaching a single chain hetrodimeric hCG to rat

LHR. Previous characterization of the YHR transgenic mice showed developmental alterations in the gonads. Testis sizes were reduced and an apparent decrease in the area of the seminiferous tubules was observed in testicular sections. Degenerative changes including the presence of cysts were observed in the ovaries. The main goals of my present project are 1) to perform a quantitative analysis of seminiferous tubule area to confirm the observed reduction in the testis sections of YHR transgenic mice. A digital image analysis of testicular sections using the NIH Image J software showed that the cross-sectional area of the tubules was significantly reduced in YHR transgenic mice consistent with the decrease in testicular size. 2) to determine the effect of the mouse genetic background on the ovarian phenotype and pathology. For this study, YHR mice will be bred into a CF1 genetic background and a histological analysis of their ovaries will be performed.

Back to Authors
Back to Titles

The Honors Program's
Center for Undergraduate Research Opportunities

Symposium 2005
Program and Abstracts

CURO Office
203 Moore College
The University of Georgia
Athens, GA 30602
(706) 542-5871
http://www.uga.edu/honors/curo

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Table of Contents

CURO
Center for Undergraduate Research Opportunities

Symposium 2006

University of Georgia, Tate Student Center
April 10-11, 2006

CALL FOR ABSTRACTS

The Center for Undergraduate Research Opportunities at the University of Georgia provides a forum for all undergraduates to present original research sponsored by faculty members. Undergraduate students from all disciplines are encouraged to participate. Representatives of public and private higher education institutions in Georgia are encouraged to apply.

Presentations may be in the form of an oral presentation, poster session, exhibition, performance, or work of art. Students can also present a tutorial about a research methodology or new technology. Undergraduate researchers who are at various stages of the research process are encouraged to submit abstracts describing where they are in the research process and the issues they face. Those who wish to present their work should submit an application (available on the CURO web site at www.uga.edu/honors/curo), an abstract of a maximum of 250 words in electronic form, and a brief supporting letter from the sponsoring faculty member (the letter can be uploaded onto the CURO web site for submission) no later than January 13, 2006. Group research projects should be submitted with one application and one letter of faculty support. All abstracts will receive graduate student peer review with faculty guidance. All participants accepted into the symposium will be notified by February 17, 2006, and their abstracts will be published in a book of abstracts. Sponsoring faculty will be invited to preside at their students' sessions.

Best Paper Awards
Papers accepted for presentation at the CURO symposium that are submitted by March 20, 2006 will be considered for "Best Paper" awards in the humanities, the sciences, and the social sciences. Awards will also be given to the best papers with an international focus and with a focus on civic responsibility. Papers must be submitted electronically to curo@uga.edu. Maximum length is 20 pages (not including bibliography or appendices).

Purposes of the Symposium:
- To highlight excellence in research by undergraduate students
- To enrich the undergraduate experience by promoting communication and cooperation between faculty and students
- To provide a forum for undergraduates to communicate and disseminate their research findings and creative works
- To provide an opportunity for undergraduate researchers in the state of Georgia to engage with their peer researchers

Criteria for Selection:
- Originality and quality of research
- Quality of written abstract
- Ethical and responsible research
- Extent of the undergraduate student's involvement in developing the research design and executing the project. Research presented at the symposium should go beyond work completed for a class paper or project.
- Letter of support from supervising faculty

This event is free and open to the public. All interested faculty and students are encouraged to attend the CURO Symposium. For more information, contact Dr. Pamela B. Kleiber, Associate Director, Honors Program, 203 Moore College, Athens, Georgia, 30602, pkleiber@uga.edu, (706) 542-0530.

CURO Symposium 2005 At A Glance

Monday, April 11th, 2005

Concurrent Oral Sessions (three 50 min. sessions) — **12:20 -3:20 p.m.**
Tate Student Center, Conference Rooms 138, 139, 140, 143, 144 — *sessions acc. to MWF class schedule

Welcome and Opening Session — **4:00 p.m.**
Tate Student Center, Georgia Hall A
Dr. David S. Williams
Director, Honors Program
Dr. Gordhan Patel
Vice President for Research and Exec. Director of the University of Georgia Research Foundation

Introduction of Keynote Speaker — **Jeremy Johnson**
Managing Editor, *Journal for Undergraduate Research Opportunities (JURO)*

Keynote Address: "Transposable Elements: Teaching Old Genomes New Tricks" — **Dr. Sue Wessler**
Distinguished Research Professor of Plant Biology

Reception and Poster Presentations — **5:00 p.m. – 7:00 p.m.**
Tate Student Center, Georgia Hall

Art Gallery Opening and Artist Talks — **7:00 p.m. – 8:30 p.m.**
Tate Student Center Gallery
Prof. Carmon Colangelo
Director, Lamar Dodd School of Art
Ms. Robin Dana
Gallery Director, Lamar Dodd School of Art
Daniel Gough
JURO Fine Arts Editor

CURO Apprentice and Alumni Reception — **7:00 p.m. – 8:00 p.m.**
Tate Student Center, Reception Hall
Melissa Cabinian and Melvin Hines, Jr.
CURO Alumni and Senior Peer Advisors
Ms. Catherine Packer
Graduate Assistant

Tuesday, April 12th, 2005

Concurrent Oral Sessions (three 75 min. sessions) — **9:30 a.m. – 1:45 p.m.**
Tate Student Center, Conference Rooms 138, 139, 140, 143, 144 — *sessions acc. to TR class schedule

Vendor Market — **10:00 a.m. – 2:00 p.m.**
Tate Student Center, Georgia Hall

NIF Research Project — **11:30 a.m. – 1:00 p.m.**
Tate Student Center, Conference Room 145 — Jeremy Johnson

Performing Arts Presentations — **2:00 p.m. – 4:15 p.m.**
Tate Student Center, Georgia Hall

JURO: Meet the Editors — **2:30 p.m. – 4:00 p.m.**
Tate Student Center, Reception Hall

Closing Ceremony and Awards — **4:30 p.m. – 5:30 p.m.**
Tate Student Center, Georgia Hall
Dr. Arnett C. Mace, Jr.
Senior Vice President for Academic Affairs and Provost
Professor Jere Morehead
Vice Provost for Academic Affairs

Monday, April 11, 2005

Concurrent Oral Sessions
Tate Student Center Conference Rooms 138, 139, 140, 143, 144

12:20 - 1:10 p.m. First Concurrent Session

Room 138	**Shana Strickland**	The Socialization of Anger among Maltreating and Nonmaltreating Mothers
	Faculty Mentor	Dr. Kimberly Shipman, Department of Psychology, University of Georgia
	Wendy Ballew, Ann Howell, Andrew Anderson	Toy Preferences in Relation to Gender Stereotypes: Comparing Children from Single versus Two-Parent Households
	Faculty Mentor	Dr. Tsu-Ming Chiang, Department of Psychology, Georgia College and State University
	Christopher Stokes	Child Attentional Control in the Classroom Milieu
	Faculty Mentor	Dr. Randy Kamphaus, Department of Educational Psychology, University of Georgia
Room 140	**Lauren Dominick**	The Artist in Cuba
	Faculty Mentors	Dr. Dana Bultman, Department of Romance Languages, University of Georgia Prof. Judy McWillie, Lamar Dodd School of Art, University of Georgia
	Erika Vinson	Arts Integration in School Curriculum as a Motivator for Student Success
	Faculty Mentor	Dr. Richard Siegesmund, Art Education, University of Georgia
	Jeremy Johnson	*The Journal for Undergraduate Research Opportunities*: Building an Undergraduate E-journal for Research in the Arts and the Humanities
	Faculty Mentor	Dr. Pamela Kleiber, Center for Undergraduate Research Opportunities, Honors Program, University of Georgia
Room 143	**Benjamin Cannon**	Identification of RNA Binding Proteins' Role in Gene Regulation in *T. cruzi*
	Faculty Mentor	Dr. Rick Tarleton, Department of Cellular Biology, University of Georgia
	Kate Connell	Blockade of Cannabinoid Receptors in the Basolateral Nucleus of the Amygdala Suppresses Stress-Induced Analgesia
	Faculty Mentor	Dr. Andrea Hohman, Department of Psychology, University of Georgia
	Edmund Fomunung	Production of Antibodies to Erythrocyte Invasion Proteins of *Plasmodium falciparum* and Their Use to Investigate Erythrocyte Invasion

	Faculty Mentor	Dr. David Peterson, Department of Medical Microbiology and Parasitology, University of Georgia
Room 144	**Kevin Patrick**	Marcus Tullius Cicero: The Foundations of a Legal Education during the Roman Republic
	Faculty Mentor	Dr. James C. Anderson, Department of Classics, University of Georgia
	Rafael Young	Civil Rights Figures Appearing in the Multicultural Archive of Georgia
	Faculty Mentor	Dr. Timothy Powell, Department of English, University of Georgia
	Jora Vaso	The Effect of Communism on Eastern European Literature: With a Focus on Ivo Andric, Wislawa Szymborska, and Ismail Kadare
	Faculty Mentor	Dr. Katarzyna Jerzak, Department of Comparative Literature, University of Georgia

1:25 - 2:15 p.m. Second Concurrent Session

Room 138	**Cara Altimus**	Light Receptors for the Biological Clock in *Neurospora crassa*
	Faculty Mentor	Dr. Jonathan Arnold, Department of Genetics, University of Georgia
	Natalie Jennings, Annie Tran, Ezinne Okwandu	Gene Expression in Human Embryonic Stem Cells
	Faculty Mentor	Dr. Lee Pratt, Department of Plant Biology, University of Georgia
	Charya By	Characterization of the Presence of Integrons and Gene Cassettes in *Salmonella* Isolates by Polymerase Chain Reaction Assays
	Faculty Mentor	Dr. Susan Sanchez, Athens Diagnostic Laboratory, University of Georgia
Room 139	**Brunilis Burgos-Rivera**	Actin Depolymerizing Factor Regulates Key Growth Processes in *Arabidopsis*
	Faculty Mentor	Dr. Richard B. Meagher, Department of Genetics, University of Georgia
	Harry G. Butler IV	Three Dimensional Monte Carlo Simulation of Vapor Deposition Polymerization
	Faculty Mentor	Dr. Yiping Zhao, Department of Physics and Astronomy, University of Georgia
	Namrata Asuri	An Analysis of the Role of Polyadenylation in tRNA Processing in *E. coli*
	Faculty Mentor	Dr. Sidney Kushner, Department of Genetics, University of Georgia

Room 140	**Amanda Dempsey**	Microarray and qRT-PCR Analysis of Gene Expression in CD8+ T Cells from *T. cruzi* Infected Mice
	Faculty Mentor	Dr. Rick Tarleton, Department of Cellular Biology, University of Georgia
	Nicole Warren	Glycopeptide Isolation and Glycosylation Site Identification: A Standardized Procedure
	Faculty Mentor	Dr. Michael Pierce, Department of Biochemistry, University of Georgia
	Fei Yang	Regulation of Branched-Chain Amino Acid Catabolism in *Streptomyces coelicolor*: Applications for Metabolic Engineering of Polyketide Antibiotic Biosynthesis
	Faculty Mentor	Dr. Janet Westpheling, Department of Genetics, University of Georgia
Room 143	**Megan Leroy**	The All-American Icon: Frank O'Hara and Coca-Cola Advertising in 1950's America
	Faculty Mentor	Dr. Susan Rosenbaum, Department of English, University of Georgia
	Gene Kim	"Comprehensive Responsibility" and Economic Growth
	Faculty Mentor	Dr. Santanu Chatterjee, Department of Economics, University of Georgia
	Grace Anglin	An Artistic Representation of the Post-September 11th Islamic Community
	Faculty Mentor	Prof. Laleh Mehran, Digital Media, School of Art, University of Georgia
Room 144	**Charlie Pitts, Jr.**	An Evaluation of Red Hat Inc.'s Business Practices, as it Relates to the Development and Distribution of Free and Open Source Software
	Faculty Mentor	Dr. Mark Huber, Management Information Systems, University of Georgia
	Natalia Nicholls and Erendira Casas	What is the True Cost Per Minute When Using Prepaid Telephone Calling Cards?
	Faculty Mentor	Dr. Julia Marlowe, Department of Housing and Consumer Economics, University of Georgia
	Mary Gassama	Student Attitudes Concerning Abortion
	Faculty Mentor	Dr. James Bason, Survey Research Center, University of Georgia

2:30 p.m. - 3:20 p.m. Third Concurrent Session

Room 138	**David M. Smith**	Samuel Beckett and the Antinomies of Author and Audience
	Faculty Mentor	Dr. Adam Parkes, Department of English, University of Georgia
	Leslie Wolcott	Georgia's Environmental Literature: A Survey of Contemporary Works
	Faculty Mentor	Dr. Betty Jean Craige, Comparative Literature and Center for Humanities and Arts, University of Georgia

	Lauren MacDonald	History Defeated: The Art of Kara Walker
	Faculty Mentor	Prof. Isabelle Wallace, Art History, Department University of Georgia
Room 139	**Ashley Johnson**	Bilingual Healthcare: Challenges Posed and How they Are Met
	Faculty Mentor	Dr. John Ross, Department of Romance Languages, University of Georgia
	Rebecca Brantley	Mariska Karasz and Hungary: Early Design and Influences
	Faculty Mentors	Dr. Thomas Houser, School of Art, University of Georgia Ms. Ashley Callahan, Georgia Museum of Art, University of Georgia
	Amy Buffington, Erin Klosson, Jessica Zabell	An Age Appropriate Method in Assessing Young Children's Emotional Competence
	Faculty Mentor	Dr. Tsu-Ming Chiang, Department of Psychology, Georgia College and State University
Room 140	**Erin Bohan**	The Reconciliation of Selves: The Immigrant Experience in America
	Faculty Mentor	Dr. Katarzyna Jerzak, Department of Comparative Literature, University of Georgia
	Josh Marsh	Shakespeare's Words in Moving Images
	Faculty Mentor	Dr. Fran Teague, Department of English, University of Georgia
	Daniel Gough	Ethnomusicology and the Theory of Race: A Brazilian Case Study
	Faculty Mentor	Dr. Jean Kidula, School of Music, University of Georgia
Room 143	**Chris Holland**	Rank, Ritual, and Akbar the Great
	Faculty Mentor	Dr. Farley Richmond, Department of Drama and Theatre, University of Georgia
	Jeremy Johnson	Shahidki: The Black Widows of Chechnya
	Faculty Mentors	Dr. Amy Ross, Department of Geography, University of Georgia Dr. Eve Marie Troutt Powell, Department of History, University of Georgia
	Alexander Skiles	Dispositionalism and the Principle of Least Action: Reply to Katzav
	Faculty Mentor	Dr. Yuri Balashov, Department of Philosophy, University of Georgia

4:00 p.m. Welcome and Opening Session

Tate Student Center, Georgia Hall A

Introductions and Welcome	Dr. David S. Williams, Director of the Honors Program Dr. Gordhan Patel, Vice President for Research and Executive Director of the University of Georgia Research Foundation

Introduction of Dr. Wessler	Jeremy Johnson, Foundation Fellow, Russian Language and History
Keynote Address	Dr. Sue Wessler Distinguished Research Professor of Plant Biology "***Transposable Elements: Teaching Old Genomes New Tricks"***

5:00-7:00 p.m. Reception and Poster Presentations

Tate Student Center, Georgia Hall

Poster Presentations

Julie Ahern, Janet E. Frick, Shannon Looney, Jessica Peters	The Effects of Total Communication on the Comprehension Abilities of First Grade Students
Faculty Mentor	Dr. Janet E. Frick, Department of Psychology, University of Georgia
Westin Amberge	Culture and Differentiation of *Ulex Europaeus* Agglutinin I Binding Human Embryonic Stem Cells with Direction towards an Endothelial Lineage
Faculty Mentor	Dr. Steven Stice, Department of Animal and Dairy Science, University of Georgia
Conrhonda Baker	Creating Inclusive Campuses through Recognizing Linguistic, Geographic, and Socioeconomic Diversity
Faculty Mentor	Dr. Kecia Thomas, Institute for African American Studies, University of Georgia
William Barrow	Identification of *Mycobacterium tuberculosis* Hypoxia-induced Genes Required for Intracellular Survival
Faculty Mentor	Dr. Russ Karls, Department of Infectious Diseases, University of Georgia
Christine Bassett	The Role of Female Choice in Sexual Selection of *Drosophila pseudoobscura*
Faculty Mentors	Dr. Yong-Kyu Kim, Department of Genetics, University of Georgia Dr. Wyatt Anderson, Department of Genetics, University of Georgia
Susan Bennett	Differences in Shell Availability, Hermit Crab Size, and Shell Diversity in Two Costa Rican Beaches
Faculty Mentors	Dr. Diana Lieberman, Institute of Ecology, University of Georgia Dr. Milton Lieberman, School of Marine Programs, University of Georgia
Layne Bradley	Surface Plasmon Resonance from Aligned Ag Nanorod Structures
Faculty Mentor	Dr. Yiping Zhao, Department of Physics and Astronomy, University of Georgia

Josef Broder	Multivariate Harmonic Analysis
Karen A. Holbrook Academic Support Award	
Faculty Mentor	Dr. Andrew Sornborger, Department of Mathematics, University of Georgia
Harry Galvin Butler IV	Three Dimensional Monte Carlo Simulation of Vapor Deposition Polymerization
Faculty Mentor	Dr. Yiping Zhao, Department of Physics and Astronomy, University of Georgia
Anjali Chaudhari	Analysis of *Pax6a* Expression Using a BAC Transgene
Faculty Mentor	Dr. James Lauderdale, Department of Cellular Biology, University of Georgia
Christina Chotiwat	Inhibition of Corticotropin-releasing Factor Receptors during Repeated Restraint Reduces Hyperresponsiveness to a Subsequent Stressor
Faculty Mentor	Dr. Ruth Harris, Department of Foods and Nutrition, Medical College of Georgia
Amy Chudgar	The Role of Angiogenic Factors in Vessel Formation
Faculty Mentor	Dr. Brenda Lilly, Vascular Biology Center, Medical College of Georgia
Collin Closek and Sarah Kilgore	Exploration and Manipulation of Objects and Surfaces by Common Chimpanzees (*Pan troglodytes*) and Capuchin Monkeys (*Cebus apella*)
Faculty Mentor	Dr. Dorothy Fragaszy, Department of Psychology, University of Georgia
Paul Courtwright	Effects of Shared Environment during Development on the Adult Behavior of *Drosophila paulistorum*
Faculty Mentor	Dr. Wyatt Anderson, Department of Genetics, University of Georgia
Caelin Cubenas	The Role of Autophagy in Neurodegenerative Disease
Faculty Mentor	Dr. Marcus Fechheimer, Department of Cellular Biology, University of Georgia
Sita Damaraju	Effect of Different Bifunctional Linkers on Biological Activity of Functionalized Silicon Nanorods for Glucose Sensors
Faculty Mentor	Dr. William Kisaalita, Department of Biological and Agricultural Engineering, University of Georgia
Taylor Deal	A Comparison among Three Methods to Detect Newcastle Disease Virus in Formalin-fixed, Paraffin-embedded Tissues
Faculty Mentor	Dr. Corrie Brown, Department of Veterinary Pathology, University of Georgia

Anjan Deka	Establishing Mammalian Cell Lines that Modulate O-linked N-Acetlyglucosamine, O-GlcNAc, levels to Characterize Its Role in Apoptosis and Insulin Action
Faculty Mentor	Dr. Lance Wells, Department of Biochemistry and Molecular Biology, University of Georgia
John DuVal	Alternatively Spliced Transcripts of Matrix Metalloproteinase-2 in Ovarian Cancer Cells
Faculty Mentors	Dr. David Puett, Department of Biochemistry and Molecular Biology, University of Georgia Dr. Michael Geller, Department of Physics and Astronomy, University of Georgia
Dustin Dyer	Laplace Force During Wetting of Vertically Aligned Nanorod Array
Faculty Mentor	Dr. Guigen Zhang, Department of Biological and Agricultural Engineering, University of Georgia
Tiffany Gartrell	The Substrate Specificity of Rce1p
Faculty Mentor	Dr. Walter K. Schmidt, Department of Biochemistry and Molecular Biology, University of Georgia
Christopher Hale	Adolescent Vulnerability to Nicotine Addiction: A Biological Basis
Faculty Mentor	Dr. Thomas F. Murray, Department of Physiology and Pharmacology, University of Georgia
Phillip Benson Ham III	Gas Phase Synthesis and Time of Flight Mass Analysis of Novel Semiconductor Clusters Containing Sulfur and Group Thirteen Metals
Faculty Mentor	Dr. Michael A. Duncan, Department of Chemistry, University of Georgia
Matthew Hastings	Implications of Unique Mineral Assemblages Associated With Subterranean Coal Fires
Faculty Mentor	Dr. Paul A. Schroeder, Department of Geology, University of Georgia
Catherine Hudson	Creating an Inexpensive and Fast Method for Screening Potential Drug Compounds for Narrow Spectrum Targeting of the Heme Biosynthetic Pathway
Faculty Mentor	Dr. Harry Dailey, Department of Microbiology, University of Georgia
Ashley Jackson, Shauncre Mitchell, Nikkitress Nelson	Research Experience for Undergraduates [REU]: Encouraging Underrepresented Students to Careers in Science via the GA Herbarium Cultivated/Economic Plant Voucher Collection
Faculty Mentor	Dr. Wendy Zomlefer, Department of Plant Biology, University of Georgia

Natalie Jennings, Annie Tran, Ezinne Okwandu	Gene Expression in Human Embryonic Stem Cells
Faculty Mentor	Dr. Lee Pratt, Department of Plant Biology, University of Georgia
Ashley Johnson	*Vibrio fischeri ArcA*- Mutant Sheds New Light on Bioluminescence Regulation
Faculty Mentor	Dr. Eric Stabb, Department of Microbiology, University of Georgia
Jeremy Johnson	*The Journal for Undergraduate Research Opportunities*: Building an Undergraduate E-journal for Research in the Arts and the Humanities
Faculty Mentor	Dr. Pamela B. Kleiber, Center for Undergraduate Research Opportunities, Honors Program, University of Georgia
Brittany R. King	Attributional Style, Spirituality, and Religious Problem-Solving: Implications for Psychological Well-Being in African American College Students
Faculty Mentor	Dr. Rosemary Phelps, Department of Counseling and Human Development Services, University of Georgia
Allison Koch	Quinic Acid Cluster Computational Model Analysis of RNA and Protein Intensities
Faculty Mentor	Dr. Jonathan Arnold, Department of Genetics, University of Georgia
Jessica Laverentz	Multiple Mates Enhance Offspring Viability for Female *Drosophila pseudoobscura*
Faculty Mentor	Dr. Patricia A. Gowaty, Department of Genetics University of Georgia
Anna Lee	Effects of Environmental Contaminant Perchlorate on Rat Thyroid Sodium-Iodide Symporter (NIS) mRNA Expression
Faculty Mentor	Dr. Duncan Ferguson, Department of Physiology and Pharmacology, University of Georgia
Robin Ligler	Using Streptolysin O for Cell Permeabilization to Determine G-Protein Activation
Faculty Mentor	Dr. David Puett, Department of Biochemistry and Molecular Biology, University of Georgia
Jay McCracken	The Effect of Mutations on the Substrate Specificity of RCE1
Faculty Mentor	Dr. Walter K. Schmidt, Department of Biochemistry and Molecular Biology, University of Georgia
Jon McGough	Conspecific Sperm Precedence in *Drosophila pseudoobscura*
Faculty Mentors	Dr. Wyatt Anderson, Department of Genetics, University of Georgia Dr. Yong Kyu Kim, Department of Genetics, University of Georgia

Jonathan McWhorter	Phenotypic Changes in Dendritic Cell and T lymphocyte Subpopulations of Mice Infected with *Schistosoma mansoni* or Exposed to *S. mansoni* Eggs
Faculty Mentor	Dr. Daniel Colley, Department of Microbiology, University of Georgia
Amulya Nagarur	Functional Analysis of Yeast Axl1, Ste23, and IDE Mutants
Faculty Mentor	Dr. Walter K. Schmidt, Department of Biochemistry and Molecular Biology, University of Georgia
Natalie Nicholls and Erendira Casas	What is the True Cost per Minute When Using Prepaid Telephone Calling Cards?
Faculty Mentor	Dr. Julia Marlowe, Department of Housing and Consumer Economics, University of Georgia
Matthew Nicholson	Detecting RSV Virus by Quartz Crystal Microbalance
Faculty Mentor	Dr. Yiping Zhao, Department of Physics and Astronomy, University of Georgia
Tatyana Nienow	A Novel Assay for Insulin Degrading Enzyme and it Yeast Orthologs Ste23p and Axl1p Are Recently-Discovered Metalloproteases Found in the Yeast
Faculty Mentor	Dr. Walter K. Schmidt, Department of Biochemistry and Molecular Biology, University of Georgia
William Parker	Creation of a Novel Ribonuclease T1 Gene for Protein Folding Studies
Faculty Mentor	Dr. Marly Eidsness, Department of Chemistry, University of Georgia
Gehres Paschal	Constitutively Active Lutropin Receptor Mutants Associated with Familial Male-Limited Precocious Puberty
Faculty Mentor	Dr. David Puett, Department of Biochemistry and Molecular Biology, University of Georgia
Karen Petree	How African Americans Think about the Links Between Disease and Race
Faculty Mentor	Dr. Celeste Condit, Department of Speech Communication, University of Georgia
Matt Rudy	Cloning and Expression of a Trigger Factor Variant for Protein Folding Studies
Faculty Mentor	Dr. Marly Eidsness, Department of Chemistry, University of Georgia
Amy Sexauer	*In Situ* Hybridization Detection of *Babesia microti* in Experimentally Infected Hamster Tissues
Faculty Mentor	Dr. Corrie Brown, Department of Veterinary Pathology, University of Georgia

Adam Singer	Distribution of MMP-2, -9 and -19 Alternative Splice Variants in Pre-Neoplastic Ovarian Surface Epithelium and Ovarian Cancer Cell Lines
Faculty Mentor	Dr. David Puett, Department of Biochemistry and Molecular Biology, University of Georgia
Matthew J. Stewart	Pancreatic Lesions in Chickens Experimentally Infected with Newcastle Disease Viruses of Different Virulence
Faculty Mentor	Dr. Corrie Brown, Department of Veterinary Pathology, University of Georgia
Adam Stroupe	Drug and Nutrient Trafficking in the Human Pathogen *Cryptosporidium parvum*
Faculty Mentor	Dr. Boris Striepen, Department of Cellular Biology, University of Georgia
Teerawit Supakorndej	Recruitment of Human Telomerase RNA to the Telomeres of Human Cancer Cells
Faculty Mentor	Dr. Michael Terns, Department of Genetics, University of Georgia
John Henry Theiss	Isolation of Mutants of *Arabidopsis thaliana* Having Insertions in Genes Thought to Encode Necessary Components of Plant Cell Wall Synthesis
Faculty Mentor	Dr. Michael Hahn, Department of Plant Biology, University of Georgia
Tendoh Timoh	Trigger Factor (TF) Assisted Co-translational Folding Using Fluorophore Modified Nascent Peptides Synthesis and Characterization of Fluorophore-Modified Trigger Factor for Protein Folding Studies
Faculty Mentor	Dr. Marly Eidsness, Department of Chemistry, University of Georgia
Erika Vinson	Arts Integration in School Curriculum as a Motivator for Student Success
Faculty Mentor	Dr. Richard Siegesmund, Art Education, University of Georgia
Nicole Warren	Glycopeptide Isolation and Glycosylation Site Identification: A Standardized Procedure
Faculty Mentor	Dr. Michael Pierce, Department of Biochemistry and Molecular Biology, University of Georgia
Alyson Weber	Creation of an *in vitro* Transcription System for *Mycobacterium tuberculosis*
Faculty Mentor	Dr. Russell Karls, Department of Infectious Diseases, University of Georgia
Matthew Weiss	Assessing Correlations between Elite Media Coverage and Movement in Public Opinion Polls During Presidential Elections

Faculty Mentor	Dr. Audrey Haynes, Department of Political Science, University of Georgia
Stephanie Yarnell	Analysis of the Interactions between Chondroitins and Pectins
Faculty Mentor	Dr. Carl Bergmann, Complex Carbohydrate Research Center, University of Georgia
Rafael R. Young	Civil Rights Figures Appearing in the Multicultural Archive of Georgia
Faculty Mentor	Dr. Timothy Powell, Department of English, University of Georgia

7:00 p.m. - 8:30 p.m. **Artist Talks**
Tate Student Center Gallery

Introductions	**Daniel Gough,** Foundation Fellow and *JURO* Arts Editor **Prof. Carmon Colangelo,** Director, Lamar Dodd School of Art **Ms. Robin Dana**, Gallery Director, Lamar Dodd School of Art

Visual Arts Presenters

Lauren Dominick	Sculpture
Faculty Mentors	Dr. Dana Bultman, Department of Romance Languages, University of Georgia Professor Judith McWillie, Department of Sculpture, University of Georgia
Jessica Horwitz	Photography
Faculty Mentor	Ms. Robin Dana, Department of Photography, University of Georgia
Adrienne Lynch	Ceramics
Faculty Mentor	Professor Ted Saupe, Department of Ceramics, University of Georgia
Faith Ploener	Photography
Faculty Mentor	Professor Ben Reynolds , Department of Photography, University of Georgia
Richard Brandon Puett	Painting
Faculty Mentor	Professor Joseph Norman, Department of Drawing and Painting, University of Georgia
Richard T. Scott	Painting
Faculty Mentor	Professor Margaret Morrison, Department of Drawing and Painting, University of Georgia

Art Exhibit arranged by Ms. Robin Dana, Gallery Director, Lamar Dodd School of Art

Tuesday, April 12, 2005

Concurrent Oral Sessions

Tate Student Center Conference Rooms 138, 139, 140, 143, 144

9:30 – 10:45 a.m. First Concurrent Session

Room 138	**Layne Bradley**	Surface Plasmon Resonance from Aligned Ag Nanorod Structures
	Faculty Mentor	Dr. Yiping Zhao, Department of Physics and Astronomy, University of Georgia
	Phillip B. Ham III	Gas Phase Synthesis and Time of Flight Mass Analysis of Novel Semiconductor Clusters Containing Sulfur and Group Thirteen Metals
	Faculty Mentor	Dr. Michael A. Duncan, Department of Chemistry, University of Georgia
	Katherine Price	Characterization of Chromosomal Integration by *Streptomyces* Bacteriophages: Use in Mammalian Genetic Engineering
	Faculty Mentor	Dr. Janet Westpheling, Department of Genetics, University of Georgia
	Javier Valle	Characterization of Transgenic Mice Expressing a Genetically Altered Luteinizing Hormone Receptor
	Faculty Mentor	Dr. Prema Narayan, Department of Biochemistry and Molecular Biology, University of Georgia
Room 139	**Michelle Borden**	The Nature of the Low-Energy Excited State in Benzoyl-Substituted Ferrocenes
	Faculty Mentor	Dr. Charles Kutal, Department of Chemistry, University of Georgia
	Tyson Turner	Establishing a Tumor Marker Database through Chemiluminescent Immunoassay Analyses
	Faculty Mentor	Dr. David Puett, Department of Biochemistry and Molecular Biology, Georgia State University
	Linda Fernekes	Expression of *Magnaporthe grisea* Extracellular Proteins in a Modified *Pichia pastoris* Expression System
	Faculty Mentor	Dr. Sheng-Cheng Wu, Complex Carbohydrate Research Center, University of Georgia
	Seema Patel, Julie Gordon	Analysis of Bmp Signaling during Thymus Organogenesis Using Neural Crest Specific Knockout Mice
	Faculty Mentor	Dr. Nancy Manley, Department of Genetics, University of Georgia
Room 140	**Anjan Deka**	Establishing Mammalian Cell Lines that Modulate O-linked N-Acetlyglucosamine, O-GlcNAc, levels to Characterize Its Role in Apoptosis and Insulin Action

	Faculty Mentor	Dr. Lance Wells, Department of Biochemistry and Molecular Biology, University of Georgia
	Beau Bryan	Cadherin-Mediated Cell-Cell Adhesion Regulated By GnT-V Expression
	Faculty Mentor	Dr. Michael Pierce, Department of Biochemistry and Molecular Biology, University of Georgia
	Erika Lentini and Elizabeth Kantor	Serogrouping and Serotyping of *Salmonella* using PCR
	Faculty Mentor	Dr. Susan Sanchez, Athens Diagnostic Laboratory, University of Georgia
	Douglas Jackson	A Selected Ion Flow Tube Study of the Reactions of a Sequence of Ions with Amines
	Faculty Mentor	Dr. Nigel Adams, Department of Chemistry, University of Georgia
Room 143	**Amy Sexauer**	In Situ Hybridization Detection of *Babesia microti* in Experimentally Infected Hamster Tissues
	Faculty Mentor	Dr. Corrie Brown, Department of Veterinary Pathology, University of Georgia
	Disha Chhabra	Creating Expressed Sequence Tags of Human Embryonic Stem Cells
	Faculty Mentor	Dr. Lee Pratt, Department of Plant Biology, University of Georgia
	Matthew Crim	Role of Interleukin-7 Receptor in the Maintenance of Antigen-Specific CD8+ Memory T Lymphocytes in Experimental *Trypanosoma cruzi* Infection
	Faculty Mentors	Rick L. Tarleton, Department of Cellular Biology, University of Georgia Diana L. Martin, Center for Tropical and Emerging Global Diseases, University of Georgia

11:00 a.m. – 12:15 p.m. Second Concurrent Session

Room 138	**Ashley Johnson**	Vibrio Fischeri ArcA- Mutant Sheds New Light on Bioluminescence Regulation
	Faculty Mentor	Dr. Eric Stabb, Department of Microbiology, University of Georgia
	Matthew Haney	Antibody Depletion of Highly-Abundant Proteins in *T. cruzi* for Fine-Tuning of Proteomic Analysis
	Faculty Mentor	Dr. Rick Tarleton, Department of Cellular Biology, University of Georgia
	Katrin Usifo	Antibiotic Use on Livestock: A Public Health Concern?
	Faculty Mentor	Dr. Susan Sanchez, Athens Diagnostic Laboratory, University of Georgia

	Christopher S. Hale	Adolescent Vulnerability to Nicotine Addiction: A Biological Basis
	Faculty Mentor	Dr. Thomas F. Murray, Department of Physiology and Pharmacology, University of Georgia
Room 139	**Matthew Nicholson**	Detecting RSV Virus by Quartz Crystal Microbalance
	Faculty Mentor	Dr. Yiping Zhao, Department of Physics and Astronomy, University of Georgia
	Kurinji Pandiyan	Fibroblast and Epithelial Cell Interactions in Tropical Pulmonary Eosinophilia
	Faculty Mentor	Dr. Julie Moore, Department of Infectious Diseases, University of Georgia
	Melissa Cabinian	Antimalarial Effects of Cysteine Protease Inhibitors in Preventing Plasmodium
	Faculty Mentor	Dr. Photini Sinnis, Department of Medical and Molecular Parasitology, New York University School of Medicine
	Layne Bradley	Fabrication of Qubit States
	Faculty Mentor	Dr. Mike Geller, Department of Physics and Astronomy, University of Georgia
Room 140	**Stephanie Yarnell**	Analysis of the Interactions between Chondroitins and Pectins
	Faculty Mentor	Dr. Carl Bergmann, Complex Carbohydrate Research Center, University of Georgia
	Lindsay Williams	Antimicrobial Resistance in *Salmonella* of Bovine Isolates in Georgia
	Faculty Mentor	Dr. Susan Sanchez, Athens Diagnostic Laboratory, University of Georgia
	Hayes Lee	Laboratory Vector Competence of *Aedes aegypti*, *Aedes albopictus*, and *Simulium vittatum* for West Nile Virus
	Faculty Mentor	Dr. Daniel Mead, Southeastern Cooperative Wildlife Disease Study, University of Georgia
Room 143	**Ginnie Bondurant**	Bringing Domestic Violence to Light: An Evaluation of Batterer Intervention Programs
	Faculty Mentor	Dr. Dean Rojek, Department of Sociology, University of Georgia
	Scott Jacques	The Management of Predation among Young, Middle Class Drug Dealers
	Faculty Mentor	Dr. Mark Cooney, Department of Sociology, University of Georgia
	Matthew Evans	In the Beginning: Initial Interests of Undergraduate Psychology Majors
	Faculty Mentor	Dr. Rosemary Phelps, Department of Counseling and Human Development Services, University of Georgia
	Chen Lin	Foreign Policy Attitudes of the Young: A Comparison of 18-24 Year Olds in Georgia and University of Georgia Students
	Faculty Mentor	Dr. James Bason, Survey Research Center, University of Georgia

12:30 – 1:45 p.m. Third Concurrent Session

Room 138	**Daniel Waldroup**	HOPE Scholarship Eligibility and Retention Rates as a Function of High School Characteristics
	Faculty Mentor	Dr. David Mustard, Department of Economics, University of Georgia
	Karen Petree	How African Americans Think About the Links Between Disease and Race
	Faculty Mentor	Dr. Celeste Condit, Department of Speech Communications, University of Georgia
	Alison Powers	The Discourse of Domestic Violence in the Latin American Community
	Faculty Mentor	Dr. Vialla Hartfield-Mendez, Department of Spanish, Emory University
	Desiree Smith	Projecting a Positive Educational Experience for Latinos in Georgia
	Faculty Mentor	Dr. Roberta Fernandez, Department of Romance Languages, University of Georgia
Room 139	**Caroline Burns**	Ethics Law in Georgia: The Interested Parties and Implications of Proposed Reforms
	Faculty Mentor	Dr. Charles Bullock, Department of Political Science, Georgia State University
	Jamarri J. Ivy	Comparing Voting Behavior of University of Georgia Students and Georgia Residents in 2004
	Faculty Mentor	Dr. James Bason, Survey Research Center, University of Georgia
	Lindsey Giffin	Economic Freedom and Its Impact on Standard of Living
	Faculty Mentor	Dr. David Mustard, Department of Economics, University of Georgia
Room 140	**Matthew Weiss**	Assessing Correlations between Elite Media Coverage and Movement in Public Opinion Polls during Presidential Elections
	Faculty Mentor	Dr. Audrey Haynes, Department of Political Science, University of Georgia
	Kate Fuller, Lauren Killion, and Liz Scharlau	Gender Differences in 360-degree Feedback Related to Leader Effectiveness
	Faculty Mentor	Dr. Karl Kuhnert, Department of Psychology, University of Georgia
	Brian Levy	Public Education and the Power Elite: Systematic Abandonment and Widespread Under-Funding
	Faculty Mentor	Dr. Linda Grant, Department of Sociology, University of Georgia
	Anne Zimmerman	Efficiency of Low-Cost Airline Carriers in a Deregulated Environment

	Faculty Mentor	Dr. David Kamerschen, Department of Economics, University of Georgia
Room 143	**Katherine Vyborny**	Examining the Balance of Social and Economic Priorities for Development in Post-Liberalization India: The Case of Kerala
	Faculty Mentor	Dr. Kavita Pandit, Department of Geography, University of Georgia
	Sara Barnhart	The Complex Nature of Helping: Altruism vs. the Struggle for Global Supremacy
	Faculty Mentor	Dr. Amy Ross, Department of Geography, University of Georgia
	Akrom Khaydarov	U.S. Foreign Policy towards Central Asia
	Faculty Mentor	Dr. Gary Bertsch, Center for International Trade and Security, University of Georgia
	Ivy Le	Hungary's PR Efforts in the Period of EU Accession: A Contemporary Case Study in International Public Diplomacy
	Faculty Mentor	Dr. Ruth Ann Lariscy, Grady College of Journalism and Mass Communication, University of Georgia
Room 144	**Clayton R. Griffith**	The Effect of the North American Beaver (*Castor Canadensis*) on Riparian Vegetation along Sub-antarctic Forested Streams in the Tierra del Fuego/Cape Horn Region of Chile
	Faculty Mentor	Dr. Amy D. Rosemond, Institute of Ecology, University of Georgia
	Andrew Leidner	Stochastic Simulations of Coevolution and Population Dynamics in Host-Parasite Systems
	Faculty Mentor	Dr. Pejman Rohani, Institute of Ecology, University of Georgia

2:00 – 4:15 p.m. Performing Arts Presentations

Tate Student Center, Georgia Hall

2:00p.m.	**Janel Long**	*Partita in E-flat* by Franz Krommer
	Faculty Mentor	Dr. Jean Martin-Williams, School of Music, University of Georgia
3:15 p.m.	**Hariqbal Basi**	*Saaki* CORE Concert Dance Company

4:30 – 5:30 p.m. Closing Session and Awards Ceremony

Tate Student Center, Georgia Hall

Introductions	**Professor Jere Morehead**, Vice Provost for Academic Affairs
Excellence in Undergraduate Research Mentoring Faculty Award	**Dr. Arnett C. Mace, Jr.**, Senior Vice President for Academic Affairs and Provost

Graduate Assistant Awards	**Dr. Maureen Grasso**, Dean of the Graduate School
Presentation of Best Paper Awards	**Professor Jere Morehead**, Associate Provost and Director of the Honors Program
Joshua Laerm Undergraduate Award	**Dr. Betsy Reitz**, Professor of Anthropology

The office of the Senior Vice President for Academic Affairs and Provost and the Honors Program established the Excellence in Undergraduate Research Mentoring Award in 2001. This award recognizes faculty, departments, and programs devoted to outstanding research mentorship of undergraduate students. Awards will be presented at the CURO Symposium Awards Ceremony on Tuesday, April 12, 2005 at 4:30 p.m. in the Tate Student Center, Georgia Hall.

2005 Awards
Faculty Awards
Dr. Gary Barnett, Odum Professor of Ecology
Dr. Sidney Kushner, Professor of Genetics
Department Award
Department of Cellular Biology
Dr. Marcus Fechheimer, Interim Department Head
Recognition
Dr. Lee Johnson, Child and Family Development
2005 Selection Committee
Dr. Roxanne Eberle, Associate Professor of English
Dr. Katherine Kipp, Associate Professor of Psychology
Dr. William S. Kisaalita, Associate Professor of Biological & Agricultural Engineering
Dr. Scott Shaw, Professor of Astronomy
Dr. Pamela Kleiber, Chair

2004 Award
Faculty Award
Dr. William S. Kisaalita, Associate Professor of Biological & Agricultural Engineering

2003 Awards
Faculty Award
Dr. Jody Clay-Warner, Assistant Professor of Sociology
Department Award
Department of Microbiology
Dr. Duncan Krause, Department Head
Dr. Tim Hoover, Undergraduate Coordinator
Program Award
The Pratt Laboratory of Plant Genomics and Bioinformatics
Dr. Lee H. Pratt, Professor
Dr. Marie-Michèle Cordonnier-Pratt, Senior Research Scientist

2002 Awards
Faculty Awards
Professor William D. Paul, Jr., Professor of Art
Dr. Katherine Kipp, Associate Professor of Psychology
Faculty Recognition
Dr. Susan Sanchez, Assistant Professor of Veterinary Medicine
Department Award
Department of Biochemistry and Molecular Biology
Dr. J. David Puett, Department Head
Program Award
"Physics Beyond the Boundaries": National Science Foundation, REU Program

Dr. Loris Magnani, Principal Investigator, Professor of Physics and Astronomy
Dr. Heinz-Bernd Schuttler, Professor and Department Head of Physics and Astronomy
Dr. Jonathan Arnold, Professor of Genetics
Dr. Susmita Datta, Professor, Georgia State University
Dr. David Logan, Professor, Clark Atlanta University
Dr. William Steffans, Professor, Clark Atlanta University

2001 Awards

Faculty Award

Dr. Marcus Fechheimer, Professor of Cellular Biology

Faculty Recognition

Dr. David MacIntosh, Associate Professor of Environmental Health Sciences
Dr. Dean Rojek, Associate Professor of Sociology

Department Award

Genetics Department
Dr. John MacDonald, Department Head

Program Award

Savannah River Ecology Laboratory
Dr. Paul Bertsch, Director

Thanks and Acknowledgements

Graduate Student Reviewers for CURO Symposium 2005

Pamela Bonner	Microbiology
Amber Brueggemann	Education
Sarah Cooley	Marine Sciences
Patrick Curtis	Microbiology
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Obidimma Ezezika	Microbiology
Peter Horanyi	Biochemistry and Molecular Biology
Erinn Howard	Microbiology
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Dr. Alison Alexander	Telecommunications
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Dr. Hugh Ruppersburg	English
Dr. David Williams	Religion, Honors Program

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Dr. Kathleen deMarrais	Social Science Education
Dr. Joseph Dominick, Jr.	Journalism
Dr. William Eiland	Art History
Dr. Marcus Fechheimer	Cellular Biology
Dr. Katarzyna Jerzak	Comparative Literature
Dr. Pamela B. Kleiber	Honors Program and CURO
Dr. Elizabeth Kraft	English
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Dr. David Porter	Botany
Dr. Dean Rojek	Sociology
Dr. Paul Schroeder	Geology
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Dr. Michael Terns	Biochemistry and Molecular Biology
Dr. Kecia Thomas	Psychology
Dr. Katharina Wilson	Comparative Literature

Karen A. Holbrook Academic Support Award Reviewers

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Dr. Harry Dailey	Professor and Director, Biomedical and Health Sciences Institute
Dr. Marcus Fechheimer	Professor and Interim Head, Cellular Biology

Karen A. Holbrook Academic Support Award Recipients

2005 Award

Josef Broder	*Multivariate Harmonic Analysis*
Faculty Mentor	Dr. Andrew Sornborger, Department of Mathematics, University of Georgia

2004 Award

Steven Jocoy	*The Prohormone Processing Protease Amontillado (AMON) Is Required During Pupal Development in Drosophila Melanogaster*
Faculty Mentor	Dr. Michael Bender, Department of Genetics, University of Georgia

The Effects of Total Communication on the Comprehension Abilities of 1st Grade Students

Julie A. Ahern
Dr. Janet E. Frick, Shannon Looney, Jessica Peters, Department of Psychology, University of Georgia

Research on the production of total communication (speech + sign language) has shown that American Sign Language signs accompanying speech provide spatial referencing/visual demonstrations of ideas that are not available in speech. This experiment examines whether, and to what extent, children who receive total communication (TC) benefit from the additional information presented by the ASL signs. It was predicted that TC would result in superior comprehension, and further, that children with sign language experience would benefit from TC to an even greater extent. To test this hypothesis, a 2 (sign language experience vs. no sign language experience) x 3 (communication condition; see below) ANOVA design exposed 32 1st grade students to videotapes of three different stories communicated through three conditions: A) speech with normal gesture, B) TC and C) speech + reversed ASL (a control condition in which the visual ASL signs were reversed, but the audio track was presented normally). Comprehension was assessed by quantifying details and descriptors of participants' recollections. Results indicated that participants' recollections of stories were no more elaborate in the TC condition than the speech with normal gesture condition ($p = .854$), but recollections in the TC condition were significantly better than those in the reversed ASL condition ($p = .045$). The level of participants' sign experience did not affect their performance in any of the communicative conditions. Further research may help to elucidate the characteristics of TC, the ages of recipients, or the amount of sign experience that would result in the greatest benefit of the enriched communication available via total communication.

Light Receptors for the Biological Clock in *Neurospora crassa*.

Cara Altimus
Dr. Jonathan Arnold, Department of Genetics, Georgia State University

Most organisms run on 24 hour cycles. While it may seem that this is not not purposeful and only run by the sun, it has been shown that the clock is actually entrained in the genes. The genes and proteins interact to create genetic networks that control all the outputs that we are more familiar with. In *N. crassa* the effect of the biological clock is shown in conidation patterns. The conidiation pattern forms because *N. crassa* produce conidia in regular intervals which leaves behind a quantifiable pattern. A blue light receptor has already been shown for this system but recently we have been able to show that there is also a red light receptor similar to the velvet A gene in *Aspergillius Nidulans*. With simple race tube experiments we have been able to show how this receptor connects to the known network. By comparing racetubes from blue and red light, the pathway for gene regulation can be understood.

Culture and Differentiation of Ulex Europaeus Agglutinin I Binding Human Embryonic Stem Cells with Direction Towards an Endothelial Lineage

Westin Amberge
Dr. Steve Stice, R. Rao, Department of Animal and Dairy Science, University of Georgia

The Ulex Europaeus Agglutinin I (UEA1) lectin is found to be expressed in most human embryonic stem cells (ES cells). It was hypothesized that a subpopulation of UEA1 expressing cells could be isolated and be used in further differentiation studies. UEA1 is a lectin previously only found to be expressed in endothelial cells, thus its expression in some ES cells may be important in the selective differentiation of these cells into endothelial cells. Having the ability to selectively differentiate ES cells to endothelial cells will give rise to many medical advances including potential roles in the treatment of heart disease and of damaged vasculature caused by other

conditions. In order to measure the ability of UEA1 expressing ES cells to differentiate into endothelial cells a subpopulation of UEA1 expressing ES cells would prove very helpful. Following this goal, ES cells were manually passaged and expanded, upon which they were magnetically sorted using a biotin-streptavidin antibody conjugation for UEA1 binding ability. The UEA1 positive cells were plated and cultured separately from the negative cells. Upon sorting, a high number of UEA1 positive cells to negative cells were noted. After immunostaining, the cells that arose from the UEA1 positive and negative cells were both positive for UEA1 binding as well as the expression of Oct4 and SSEA4, common pluripotent markers – proving the cells have not yet differentiated. It was thus concluded that the expression of UEA1 binding is not a genetically conserved trait, as its expression varies between genetically identical cells. Consequently an ES cell subpopulation of UEA1 binding cells cannot be isolated. Following this data, ES cells were sorted for UEA1 binding and then immediately plated on collagen IV in endothelial growth media, conditions known to help differentiate ES cells to endothelial cells. Specific cellular morphology differences were noted between the two cell groups, with many areas in the UEA1 positive group resembling endothelial growth.

An Artistic Representation of the Post-September 11th Islamic Community

Grace Anglin
Prof. Laleh Mehran, Digital Media, School of Art, University of Georgia

The press' advertisement of the post-September 11th "War on Terror" and our current presidential administration fail to differentiate between the Islamic fundamentalist views of terrorist groups and moderate Islam's peaceful, mainstream interpretations. The media's incorrect representations of Islamic beliefs, such as Jihad, lead many American citizens to interpret Islam as a hateful, dangerous, and scary religion. As a result, the widespread stereotypes negatively affect many American Muslims who, based on these stereotypes, experience verbal or physical assault. My project consists of a tile mosaic, an art form often used to decorate mosques, spoiled by graffiti images. These drawings embody the media's misrepresentation of Islam. The result of this misrepresentation is displayed through a series of developed blind contour drawings. Blind contour drawings are produced by drawing a subject, in my case members of the Islamic community, without looking at the paper. The resulting distorted images correspond with the distorted view many Americans have of the Islamic faith. Objects viewed as stereotypically Islamic further blind many Americans, who tend to view the individual as a terrorist and not as an American citizen. I developed the parts of the drawings that depict images stereotypical of Islam, and left the rest of the drawing unfinished and distorted, to represent the tendency to only see the stereotypical object and not the individual with which that object is associated. The point of my project is to help Americans view Muslims as people, not terrorists, and retard the growing trend of prejudice towards the Islamic community.

An Analysis of the Role of Polyadenylation in tRNA Processing in *E. coli*

Namrata Asuri
Dr. Sidney Kushner, Department of Genetics, University of Georgia

Polyadenylation is the post transcriptional addition of poly(A) residues on to the 3' termini of RNA molecules. It is known to play an important role in the post transcriptional regulation of gene expression in *Escherichia coli*. The decay of mRNAs in *E. coli* has been shown to be dependent on polyadenylation. In addition, it has been observed that the overproduction of poly(A) polymerase in *E. coli* is very toxic to the cell. One possible explanation for the loss of cell viability in the presence of excess polyadenylation is an alteration in the normal maturation of transfer RNAs (tRNAs), an important component of the cell's protein synthesis machinery. To test this hypothesis, cDNA clones of tRNACys before and after the induction of extra poly(A) polymerase were isolated. DNA sequence analysis of these clones showed a distinct

difference in the location of the poly(A) tails on the tRNA's as a function of the level of poly(A) polymerase. Subsequently, Northern blot analysis was used to examine the half-lives of various tRNAs, including tRNATrp and tRNAPro. In these experiments a series of strains containing mutations in polynucleotide phosphorylase (PNPase) and RNase II as well as a strain that overexpressed poly(A) polymerase I were used. PNPase functions as both a 3'→ 5' exonuclease and can also synthesize polynucleotide tails. RNase II also functions as a 3'→ 5' exonuclease. The results of these experiments suggested that polyadenylation is required for the normal maturation of tRNAPro and tRNATrp. In addition, PNPase also seemed to play a role in tRNA maturation. An unexpected observation from these experiments was that increased levels of polyadenylation seem to affect the half-lives of the mature tRNAHis and tRNACys. I am currently working to confirm this result.

Creating Inclusive Campuses through Recognizing Linguistic, Geographic, and Socioeconomic Diversity

Conrhonda Baker
Dr. Kecia Thomas, Institute for African American Studies, University of Georgia

The increasing globalization of the American economy creates an increased need for citizens to obtain greater education and take advantage of advanced training opportunities, especially as it relates to diversity. Yet barriers to these opportunities exist for some segments of the population, such as new immigrants and members of the working class. Enhancing access to educational opportunities for immigrants and linguistic minorities, lower and middle economic class members, and those from different regions may afford all students with advanced education as well as the opportunity to gain greater cross-cultural experience and competence. This paper begins with an analysis of the impact of Affirmative Action on higher education policies and the lack of attention to language, economic, and regional diversity. Institutional discrimination and social distancing, that is the exclusion and avoidance of the powerless by the powerful, are the lenses through which this analysis is made. Next the paper will argue for increased attention to these important dimensions of diversity for academic environments. Finally, an agenda for research on this topic is offered as are recommendations for how to enhance linguistic, economic, and regional diversity for institutions of higher education.

Toy Preferences in Relation to Gender Stereotypes: Comparing Children from Single versus Two-Parent Households

Andrew Anderson, Wendy Ballew, Ann Howell
Dr. Tsu-Ming Chiang, Department of Psychology, Georgia College & State University

Children begin to display gender stereotypical play behaviors during their fourth year of life. Most of the existing literature tends to examine children's toys preference without addressing how the make up of their family may affect these children's gender socialization. Without the benefit of modeling in the absent parent, and with the necessity of the primary caregivers' taking on nontraditional gender roles, children from single parent households may form gender norms differently than children with two parents. The present study, a part of a larger study by Chiang, is developed to examine children's toy preferences in relation to their parental make up. The data were used to determine whether differences existed in gender stereotyping behavior between two ages (age 3 and age 4) and between two types of households (single parent versus two parents). It will help us in understanding whether a child's home environment may influence children toy selection. Toys were divided into groups of neutral toys, traditionally male toys and traditionally female toys. In the study, 163 children (Age 3 = 78, boys = 39, girls = 36; Age 4 = 87, boys = 48, girls = 39) were assessed, where 116 of the children came from single parent households and 32 of the children came from two parent households. The preliminary data analyses showed interesting patterns of behaviors. The detail results and implications of the children's toy preferences will be discussed at the conference.

The Complex Nature of Helping: Altruism vs. the Struggle for Global Supremacy

Sara C. Barnhart
Dr. Amy Ross, Department of Geography, University of Georgia

Society views helping as pure altruism by those who genuinely desire to aid those who are less fortunate than themselves. However, the American public must look critically at this perception and deconstruct it. Helping is also a way in which the powerful can manipulate others. By fostering a system in which the less powerful become dependent on aid and economic interaction, nations like the United States are able to persuade these countries to adopt policies which most benefit the U.S. rather than themselves. This relationship results in a lack of independence for the less powerful nations, who are then less focused on creating a plan for their own economic independence and sustainable development. Hegemonic nations help just enough to foster dependence but not enough to break free from it, resulting in untenable relationships plagued by the animosity and resentment of the nations receiving aid.

The presentation will analyze how the complex nature of "helping" shapes the public's view of foreign policy, humanitarian aid and military intervention. It will explore the roots of the concept of helping and trace its development to the role it plays in the relationship between great powers, mainly the U.S. and developing nations. The project will be comprised of several parts deconstructing the idea of helping with regards to human rights protection, international financial aid and development and will give readers a new perspective on the motivations behind U.S. foreign policy in these areas.

Identification of *Mycobacterium tuberculosis* Hypoxia-induced Genes Required for Intracellular Survival

William Barrow
Dr. Russ Karls, Department of Infectious Diseases, University of Georgia

Two billion people worldwide are latently infected with *Mycobacterium tuberculosis*, the causative agent of tuberculosis. Two to three million individuals die of the disease each year. *M. tuberculosis*, a strict aerobe, is killed if oxygen is rapidly removed. However, if oxygen is slowly depleted the bacilli enter a dormant state. Such adaptation may facilitate survival inside the host. The protein Acr is not made under log phase growth, but is the dominant protein produced in stationary phase cultures. Expression of the *hsp*X gene encoding Acr is also induced by hypoxia. It was reported that an Acr deletion mutant (Acr-KO) was impaired for survival in macrophages. Determination of the exact nature of the Acr-KO deletion following completion of the *M. tuberculosis* genome sequencing project indicates that the expression of multiple genes was effected by the Acr deletion.

To identify which genes affected by the Acr-KO deletion facilitate macrophage survival, the Acr-KO strain and another *hsp*X deletion mutant will be complemented with the various effected genes. The *hsp*X gene and other hypoxia-induced genes will be obtained via PCR of chromosomal DNA from *M. tuberculosis* strain H37Rv. These genes will then be ligated into a plasmid able to integrate into the *M. tuberculosis* chromosome. The resulting plasmids will be introduced into the Acr deletion strains via electroporation. The complemented and noncomplemented strains will then be tested for survival by quantitating the number of viable bacilli at 0, 1, 3, and 5 days post-infection with a 1:1 ratio of bacilli to human THP-1 macrophages. The complementing regions that restore intracellular survival to the *M. tuberculosis* Acr deletion mutants will indicate the genes required for virulence. Progress toward these goals will be presented.

The Role of Female Choice in Sexual Selection of *Drosophila pseudoobscura*

Christine Bassett
Dr. Yong-Kyu Kim and Dr. Wyatt Anderson, Department of Genetics, University of Georgia

It has been observed that in some *Drosophila* species, single females are surrounded by multiple males in nature. Females perceive and act on cues from males that differ genetically by quantitative trait loci and perhaps select highly

fittest males. Therefore, genes of high fitness and genes to select for traits with high genetic quality will be passed together onto the next generations. Using *D. pseudoobscura* isofemale lines, we tested the null hypothesis that *Drosophila* females randomly mate among males. For each observation, fourteen sexually mature males were individually marked with fine dots of paint on the thorax and were released into a cage (10x10x20 cm3) where they remained together for a 5-day observation period. One virgin female from the same isofemale lines was introduced into the cage. Observations occurred daily, two hours each morning and two hours each afternoon. At copulation, the pair was removed from the cage. After identification from the marked thorax, the male was returned to the cage. This procedure was repeated with new virgin females and the number of matings per male was scored. The current data show that approximately 20% of males (n=300) were not accepted by females, about 30% accepted 1-2 times and about 10% of males mated more than 10 times during the 5-day period. In addition, we found significant differences in cuticular hydrocarbons between the males with multiple matings and the males with no mating. The males who mated multiply produced more male pheromones ($p < 0.05$). These results suggest that 1) there is a variation in mating success among males; 2) cuticular hydrocarbons could be used as indicators of individual vigor and physical status; and 3) D. pseudoobscura females mate non-randomly. Currently we are investigating the effect of multiple matings on adult and offspring fitness in *D. pseudoobscura*.

Differences in Shell Availability, Hermit Crab Size, and Shell Diversity in Two Costa Rican Beaches.

Susan Bennett
Dr. Diana Lieberman, Institute of Ecology, University of Georgia
Dr. Milton Lieberman, School of Marine Programs, University of Georgia

Tourism is a major revenue source for many tropical countries, and the environmental effects of this industry has not been fully examined. This study investigates the impact of a resort on a stretch of beach on Costa Rica's Nicoya Peninsula. In this analysis, differences in shell assemblages and hermit crab populations from two similar, proximate beach environments with varying levels of human activity—a resort and a beach inside an absolute reserve—were studied. Shells randomly selected from each beach were measured and identified to genus. Additionally, hermit crabs were collected and measured from both beach sites. The shells worn by the hermit crabs were also measured and identified to genus. Diversity and size were compared among the assemblages found empty on each beach and those found on each hermit crab population. The Reserve's beach offered larger shells of greater abundance, as hypothesized, although the Resort's shells were more diverse. The crabs collected at the Reserve were significantly larger than those collected at the Resort, perhaps as a result of the larger shells available in the Reserve. Because the most underrepresented shells were among the most colorful, this phenomenon might be caused by resort visitors' collecting of shells as souvenirs. The results of this study suggest that tourism can create the unintended consequence of altering the ecosystems visitors come to see.

The Reconciliation of Selves: The Immigrant Experience in America

Erin Bohan
Dr. Katarzyna Jerzak, Department of Comparative Literature, University of Georgia

As a country of immigrants, our literature reflects the struggle, tears, and joys of the pilgrimage to a new land. Immigrant literature allows those that have not had to face the hostility of a new environment (because our ancestors did that for us) to imagine and live the immigrant experience. The necessity and complexity of language and the confusion of identity that ensues is fascinating, and is worth a closer look.

As an "insider" attempting to understand an "outsider" and their experiences, I simply began reading autobiographies and novels written by American immigrants, looking for similarities in experience. I also looked closely at how the

immigrants spoke of language, as well as the differences of the definition of "home."

Eva Hoffman and Isabelle de Courtivron write extensively of the vacuum that is created when one is between languages, thinking and dreaming in the native, but forced to converse in the new. It seems that immigrant authors often attempt to displace displacement by writing in the new language, describing emotion and thoughts in an adopted tongue. Both Hoffman and de Courtivron suggest that it is only when an immigrant's mind captures the new language completely, that he can begin to rebuild their identity in the new country.

Ultimately, memory and nostalgia are at the root of the immigrant experience. It is through these devices that an immigrant recovers lost aspects of "home" and transposes these onto their new home, in these cases, America.

Bringing Domestic Violence to Light: An Evaluation of Batterer Intervention Programs

Ginnie Bondurant
Dr. Dean Rojek, Department of Sociology,
University of Georgia

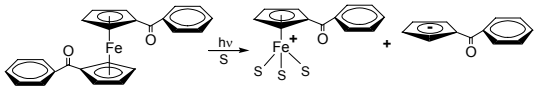
For years domestic violence has been viewed as a family concern in which the police and the courts should not be involved. However, society is now taking a hard look at just how serious a problem relationship violence is in the United States. In an effort to reduce domestic violence: laws have stiffened, police are changing how they handle domestic violence calls, and many states have mandatory prosecution for domestic violence cases. Changes in the judicial system to help victims and punish abusers have already begun; however, more insight and alterations need to occur in order for women and batterers to truly be helped.

Recent researchers have shed some sagaciousness into the limited successes of the newly implemented domestic violence laws such as mandatory arrests and prosecution as well as batterer counseling. While research has shown differing results and conclusions, an overwhelming number of researchers suggest that batterer intervention programs can be extremely successful if used properly. Through examining recent research on batterer counseling programs, numerous problems have been observed and several improvements have been suggested to make the Batterer Intervention Program a more beneficial program for both the batterer and the victim.

The Nature of the Low-Energy Excited State in Benzoyl-Substituted Ferrocenes

Michelle Borden
Dr. Charles Kutal, Department of Chemistry,
University of Georgia

Benzoyl-substituted ferrocenes have been shown to be active photoinitiators for the anionic polymerization of alkyl 2-cyanoacrylates. Irradiation into the low-energy electronic transition of these ferrocenes weakens metal-ring bonding and results in the efficient release of the cyclopentadienide anion in solvents such as methanol or acetonitrile. This process is shown below for dibenzoylferrocene (where 'S' is solvent). Previous work from this laboratory has shown that the lowest energy electronic transition in these compounds contains appreciable metal-to-ligand charge transfer character, and that this redistribution of charge is responsible for the metal-ring bond weakening. Present studies seek a better understanding of the nature of the photochemically active excited state in these compounds. The wavelength and temperature dependence of ring loss has been examined upon irradiation into the low-energy absorption band of dibenzoylferrocene. The results will allow us to decide whether (1) the initially populated Franck-Condon excited state is dissociative in nature, and therefore leads directly to ring loss in a prompt photochemical reaction, or (2) the Franck-Condon state relaxes to a thermally equilibrated excited state from which delayed reaction occurs.



Fabrication of Qubit States

Layne Bradley
Dr. Mike Geller, Department of Physics and Astronomy, University of Georgia

Quantum computing is a rapidly developing field due to the amazing goals that it hopes to achieve. As the theoretical work around the development of the first quantum computer continues to progress, scientists in the field continue to marvel at its possibilities in encryption, information processing, and pure scientific discovery in quantum mechanics. One of the most basic concepts involved in quantum computing is the very concept that provides for its potency – the qubit. While a regular bit of information in a classical computer can exist in only two possible distinct states, a quantum bit (or qubit) can theoretically exist in an infinite number of possible states. This capability would allow a quantum computer to accomplish many more tasks in a smaller amount of time than could be accomplished using a classical computer. In fact, this capability is so pronounced that a quantum computer could accomplish tasks that are, for practical purposes, impossible on a regular computer. The total possible qubit states can be visualized as points on a unit sphere. This sphere is known as the Bloch sphere and is a common idea throughout quantum computing. Implementing the idea of the Bloch sphere and given solutions to the Schrödinger, this project focuses principally on developing a method for producing any desired qubit state. Making use of computer simulations and theoretical calculations certain concepts behind the preparation of qubit states is considered. These reproducible qubit states could later be used within a quantum computer to perform various tasks and calculations.

Surface Plasmon Resonance from Aligned Ag Nanorod Structures

Layne Bradley
Dr. Yiping Zhao, Department of Physics and Astronomy, University of Georgia

Surface Plasmon Resonance (SPR) has been proven to be a highly sensitive biosensing technique for biomolecular interaction and viral detections. SPR makes use of surface waves created in thin metal films by a laser. These waves are extremely sensitive to changes in the dielectric constant of the surrounding environment. However, practical application of SPR has been very limited outside of pure research. While the optical nature and accuracy of the SPR sensor would make it ideal for detection in a variety of environments, the effect of the SPR sensor has not been as pronounced as it possibly could be due, in part, to limitations in its functionality and in the understanding of some of its basic physical properties. In this presentation, ways of experimentally increasing the sensitivity of the SPR sensor using Ag nanorods are considered, and these experiments are compared to theory in order to help provide greater understanding of the system. Herein, the experimental evidence surrounding the nanorods' capability to increase the sensitivity of the sensor will be given along with the theoretical results. As the sensitivity of the sensor increases, its overall capability for detection and usefulness are increased, and thus an increased implementation in many practical fields extending outside the realm of pure research would be expected.

Mariska Karasz: Fashion, Folk Art, and Modern Design

Rebecca Brantley
Dr. Thomas Houser, School of Art, University of Georgia
Ms. Ashley Callahan, Georgia Museum of Art, University of Georgia

The artist and designer Mariska Karasz (American, b. Hungary-1960) began her career as a fashion designer in New York during the teens. After her arrival in New York in 1914, Karasz was educated under the renowned costume designer and teacher, Ethel Traphagen, and subsequently involved in the "Designed in America" program contests and events headed by fashion industry writer and leader, M.D.C. Crawford. Bringing to America knowledge of Hungarian folk art and part of an era of modern design that paralleled the interest in "primitivism" in the fine arts, Karasz's designs reveal a strong influence of her native Hungary. Research for this paper relies on Karasz's childhood and education in Hungary, where she

was exposed to traditional peasant costume and art, her involvement and education in American art and fashion industry programs, contemporaneous articles that mention her work, and Karasz's own records. As a participant in the "Designed in America" program, Karasz was well acquainted with the belief that designers should look to Central and East European folk art as well as Native American, Asian, and Middle-Eastern sources for inspiration. Crawford specifically mentions Hungary in his writing for Women's Wear and records in a later book that Stuart Culin, the curator of the Brooklyn Museum of Art, which opened its doors to designers including Karasz, collected and advocated East European folk art. A family historian reports that Karasz imported embroidery from Hungary, and a title for a design cites a Hungarian region known for its folk art, the Mezőkövesd. Magazines and periodicals mention Karasz and often emphasize her Hungarian sources of inspiration, one particular article citing a wrap inspired by the traditional Hungarian men's coat, the szűr. Specific designs and decorations parallel Hungarian sources, for example the appliqué and embroidery used on many of Karasz's designs looks similar to the freeform designs used by peasant women on kerchiefs, aprons, and sheets, yet modified and updated for the modern, American culture for which she designs. Karasz's beautiful and innovative early designs, which range from evening gowns to swimwear, are not merely examples of progressive fashion but are unique in their inspiration and creation, anticipating her lifelong work in fashion, textiles, and the arts.

Multivariate Harmonic Analysis

Josef Broder
Dr. Andrew Sornborger, Department of Mathematics, University of Georgia

Signal noise is a problem inherent to the measurement of biological systems. Microscopic fluorescence imaging produces data that is uninterpretable in its unprocessed state. Our goal is the development of techniques to extract statistically significant signals from such high-noise data sets.

We begin by recording imaging data of a specimen subject to a periodic stimulus. We use a two photon microscope to record fluorescence responses in two bands, NADH and FAD. We then search for a statistically significant harmonic response in each band, occurring at the same frequency as the stimulus. If the nature of the biological fluorescence suggests a simultaneous response in both the NADH and FAD band, we search for correlated harmonic signals in the data sets.

To search for harmonic content, we utilize the multitaper harmonic analysis techniques introduced by Thomson. This method allows us to compute the estimated amplitude and probability of harmonic content in univariate data at a given frequency. In the multivariate case, we use an extension of Thompson's technique introduced by Sornborger. To search for correlated harmonic content in either the univariate or multivariate case, we perform a harmonic analysis of the data in each band, and consider the product of the probabilities of harmonic content as a function of frequency. In practice, this technique has the desired effect of identifying a jointly significant signal, when the significance of the signal in either band is sub-threshold. This technique also tends to reduce the detection of spurious harmonic content.

Cadherin-Mediated Cell-Cell Adhesion Regulated By GnT-V Expression

Beau Bryan
Dr. Michael Pierce, Department of Biochemistry and Molecular Biology, University of Georgia

The Pierce laboratory focuses on a particular glycosyltransferase called GnT-V (N-acetylglucosaminyltransferase-V) which has been shown to be up-regulated during oncogenic transformation. With the modulation of cell-cell adhesion and migration as the result, this enzyme (progressively stimulated as cancer develops) adds a specific β(1-6)-glycan branch to N-linked glycans as they are processed in the Golgi, implicating the involvement of GnT-V with the metastatic effects of invasive cancer. This laboratory has shown that aberrant N-linked glycoprotein glycosylation due to GnT-V

and the β(1,6) branch modulates integrin cell-matrix adhesion and cadherin calcium-dependent cell-cell adhesion. N-cadherin ("neuronal" cadherin) and E-cadherin ("epithelial" cadherin) are cell-surface glycoproteins mediating homotypic cell-cell adhesion, and aberrant glycosylation of N- and E-cadherin affects levels of cell-cell adhesion, metastasis, and invasion. Several transfections of GnT-V into human cancer cell lines which I have shown to exclusively express E-cadherin have been attempted to study if similar modulation occurs. The cell lines are very difficult to transfect, and after an extended screening process we are now awaiting verification of GnT-V activity in the (putatively) stable-transfected cell lines. We will continue the E-cadherin project if such activity is present. In order to prove that changes in glycan expression at specific glycosylation sites on N-cadherin cause the phenomena we have observed, we have subcloned human N-cadherin cDNA into the pcDNA3.1(+) expression vector. Although further tests are underway, we did not detect N-cadherin protein expression after cellular transfection of this vector, and we therefore suspect problems intrinsic to the N-cadherin cDNA we originally received from an outside laboratory. We are currently troubleshooting the N-cadherin project and are examining possibilities for future research.

An Age Appropriate Method in Assessing Young Children's Emotional Competence

Amy Buffington, Erin Klosson, Jessica Zabell
Dr. Tsu-Ming Chiang, Department of Psychology, Georgia College & State University

Emotional competency is linked to social competency, which serves as a gateway to understanding and preventing aggression. Individuals' emotional competency is currently measured in a variety of ways ranging from questionnaires, interviews, observations, and experiments. In studying emotions, Susanne Denham's puppet vignettes for interviewing preschoolers and school-aged children are the most common adopted method. The puppet vignettes are used to evaluate the child's ability in recognizing appropriate emotions given situational cues. In the present study, a part of the empathy research by Dr. Chiang, a different set of puppet vignettes are used in assessing preschoolers (age 3 and age 4). Due to limitations on young children's cognitive abilities and Denham's context specific scripts, the purpose of the present study is to design simplified interview scripts for younger children. We believe the revised scripts allow for easy randomization of the story sequence. In addition, the script was also rewritten to avoid portraying negative adult figures and to avoid suggesting negative behaviors to the children. Colorful and non-ethnic specific props and puppets were added to help maintain the child's attention. We believe that these adjustments allow for an age-appropriate assessment. In the study, 163 children (Age 3 = 78, boys = 39, girls = 36; Age 4 = 87, boys = 48, girls = 39) were assessed, 79.1% of the participants were African American and 17.2% were Caucasians. The results showed that children were able to match the appropriate emotions with the scripts. The age differences and their implications will be discussed.

Actin Depolymerizing Factor Regulates Key Growth Processes in *Arabidopsis*

Brunilís Burgos-Rivera
Richard B. Meagher, Department of Genetics, University of Georgia

Our laboratory studies the plant actin-based cytoskeleton in the model dicot plant *Arabidopsis thaliana*. The cytoskeleton controls dynamic processes both within cells and in plant development. One of the 16 families of actin binding proteins is comprised of actin depolymerizing factors (ADFs). ADFs modulate rates of actin polymerization and depolymerization by severing actin filaments and enhancing actin filament turnover. Higher plant genomes contain at least four ancient classes of ADF genes, which may be hundreds of millions of years diverged from common ancestral ADF sequences. These ADF genes are differentially expressed in various organs and tissues. To determine the functional role of two ADF genes in Arabidopsis, ADF4 and ADF9, adf4-1 and adf9-1 T-DNA insertional mutants were examined. The adf4-1 mutant plants had smaller organs at all stages of development.

This indicates that ADF4 functions in the regulation of organ size and/or growth rate. Analysis of the adf9-1 mutant plants showed delayed seed germination and many more branches than wild-type plants. This suggests that ADF9 is required for timing of germination and normal development of shoots. These initial genetic studies suggest that different ADF genes are involved in a variety of cellular and developmental processes in plants.

Ethics Law in Georgia: The Interested Parties and Implications of Proposed Reforms

Caroline Burns
Charles Bullock, Department of Political Science, University of Georgia

Ever since Republican Sonny Perdue became elected as Georgia's governor in November of 2002, he has pushed ethics reform as one of the most important items on his legislative agenda. Since that time, the governor's ethics bills have failed in the Georgia State Legislature. In turn, the governor has blamed various parties for the bill's failure, namely the special interest lobby and the Democratic Party. In 2005, the governor once again submitted an ethics bill with expectations for its passing. This is because 2005 marks the first Republican majority in the state House and Senate, a favorable circumstance for items on the governor's agenda. Additionally, as it is the mid-point of Perdue's as-yet uneventful term, he is under tremendous pressure to pass a piece of legislation to distinguish his tenure. Passage of an ethics bill could not only help the governor in this way but also give him a middle-ground issue to talk about in the 2006 gubernatorial campaign. This paper focuses on the various groups who have an interest at stake in the governor's ethics bill, the path of the previous failed ethics bills, and how the 2005 ethics bill could play a role in the 2006 gubernatorial race.

Three Dimensional Monte Carlo Simulation of Vapor Deposition Polymerization

Harry Galvin Butler IV
Dr. Yiping Zhao, Department of Physics and Astronomy, University of Georgia

Organic polymers have many applications, including organic electronics and biotechnology. Vapor deposition polymerization (VDP) is a technique used to create polymer thin films by controlled condensation of organic sources onto a subtrate. By creating an accurate simulated model of VDP with organic dimer molecules, we hope to understand the physical and chemical processes that affect growth, in order to better control the growth process and quality of polymer thin films. This paper analyzes the growth mechanism of VDP using a three-dimensional lattice Monte Carlo simulation. The polymerization model includes the deposition of organic monomers at random deposition angles, dimmer formation by two monomers through diffusion or deposition, and polymer chain propagation through monomer bulk diffusion. The simulational results will be compared to similar inorganic models as well as expiramental results of organic vapor deposition polymerizations.

Characterization of the Presence of Integrons and Gene Cassettes in *Salmonella* Isolates by Polymerase Chain Reaction Assays

Charya C. By
Dr. Susan Sanchez, Athens Diagnostic Laboratory, University of Georgia

Bacterial resistance to an increasing number of antimicrobials is a well-established problem. Numerous mechanisms involving mobile genetic elements, such as transposons and plasmids, have been confirmed to contribute to the proliferation of this resistance. In recent years a unique group of DNA mobile elements able to confer antibiotic resistance genes by site-specific recombination have been identified in gram negative bacteria. These mobile elements have been termed integrons and gene cassettes. Integrons are genetic units that include genes of a site-specific recombination system capable of capturing and mobilizing genes contained in mobile elements called gene cassettes. Southern

blot using probes specific for the integrase genes *int1* and *int2* and polymerase chain reaction (PCR) assays using specific primers for the same genes were used to screen 198 *Salmonella* cattle isolates. Cattle isolates were used in this study as it is a part of a larger project that is examining the epidemiology of antibiotic resistance of cattle and livestock of various farms throughout the state of Georgia. *Salmonella* samples were isolated from fecal, water, and feed samples from five different farms from Georgia, the DNA of the *Salmonella* were isolated using a DNA extraction procedure and kit. The isolated *Salmonella* DNA were verified using 16S PCR and InvA PCR. 16S PCR determines the presence of DNA and InvA PCR determines the presence of *Salmonella*. Once the isolates were validated to contain *Salmonella*, *int1* and *int2* PCR were performed on each isolate. In isolates that were found positive to contain *int1* or *int2*, 53 PCRs were performed to determine the size of the integron. From the PCR assays, 41% of the isolates were *int1* positive and 5% were *int2* positive. The prevalence of *int1* in dairy cattle is relatively high, suggesting possible multiple drug resistance in the *Salmonella* by the mobile integrons that can carry resistance genes. Integrons have the capability to disseminate antimicrobial resistance genes, through gene cassettes, among bacteria associated with *Salmonella* in the gastrointestinal environment. By characterizing the integrons associated with pathogenic *Salmonella* we can later characterize and compare the integrons found, if any, in the commensal bacteria of the gastrointestinal environment in order to determine if they can serve as reservoirs for antimicrobial resistance.

Antimalarial Effects of Cysteine Protease Inhibitors in Preventing Plasmodium Sporozoite Invasion of Hepatocytes

Melissa Cabinian
Dr. Photini Sinnis, Department of Medical and Molecular Parasitology, New York University School of Medicine

Widespread drug resistance of malarial parasites has impeded the effective treatment and control of malaria worldwide. The development of novel antimalarial drugs is important to combat the global burden of malaria in the future. Enzymes essential to the parasite life cycle are promising new targets for drug development. Previous research has identified a papain-family cysteine protease as a potential drug target in Plasmodium sporozoites, the infective stage of the parasite. This protease cleaves the major surface protein, circumsporozoite protein, in a process essential to sporozoite invasion of the liver. Inactivation of this enzyme using cysteine protease inhibitors has been shown to prevent invasion and thus, malaria infection. In this study, the antimalarial effects of two cysteine protease inhibitors, K777 and allicin, were evaluated. K777 is an inhibitor specific to cruzain, a cysteine protease of *Trypanosoma cruzi*. Allicin, which is derived from garlic, is an inhibitor of a broad range of cysteine proteases. A double-staining immunofluorescence technique was used to determine if the compounds prevent sporozoites from invading hepatocytes in cell culture. Malaria infection in mice treated with an inhibitor prior to inoculation with sporozoites was quantified using reverse-transcription and real time PCR of parasite rRNA. Results showed K777 and allicin inhibit sporozoite invasion of hepatocytes in vitro. K777 appeared to have no antimalarial effects while allicin reduced the infectivity of sporozoites in treated mice. These results provide further support for the novel concept of using cysteine protease inhibitors as chemotherapeutic agents for the treatment of parasitic infections.

Identification of RNA Binding Proteins' Role in Gene Regulation in *T. cruzi*

Ben Cannon
Dr. Rick Tarleton, Department of Cellular Biology, University of Georgia

Trypanosoma cruzi, the protozoan parasite that causes Chagas' Disease, is responsible for approximately 50,000 deaths each year. Currently, there is no effective treatment for *T. cruzi* infection. Evidence suggests that gene expression is regulated almost exclusively at the post-transcriptional level. RNA binding proteins (RBP's) are thought to play a major role in gene expression by stabilizing, or not, transcripts produced by polycistronic transcription. Unfortunately, very few RBP's have been

identified and studied for their roles in regulating gene expression. The Tarleton lab has been engaged in a high-throughput gene cloning project in order to screen *T. cruzi* genes as viable vaccine candidates. This project aims to further characterize probable RBP's encoded in the *T. cruzi* genome identified as containing RNA-recognition motif-type RNA-binding domains. The *T. cruzi* genome contains approximately 70 unique RBP's. Approximately half of these had been previously cloned in the Tarleton Lab. Most of the remaining half have since been cloned and a protein array for analysis of RNA-binding activity utilizing non-radioactively labeled RNA is being developed. The goal is to first verify RBP activity for as many of these gene products as possible, then to identify RBP's that bind transcripts from parasite lifecycle stages present in mammalian hosts. This information should increase our understanding of gene regulation in *T. cruzi* and highlight approaches to more effective, less severe treatments and vaccines for *T. cruzi* infection.

What is the True Cost per Minute When Using Prepaid Telephone Calling Cards?

Erendira Casas and Natalia Nicholls
Dr. Julia Marlowe, Department of Housing and Consumer Economics, The College of Family and Consumer Sciences, University of Georgia

Consumers complain about prepaid telephone cards. A research project was developed to investigate the true cost of the cards and information available from customer service. Because there is no regulation requiring disclosure information with prepaid phone cards in Georgia, consumers cannot easily find the real cost per minute.

The UGA President's Venture Fund provided funding to purchase prepaid telephone cards. Bilingual UGA students made international calls to Spanish-speaking countries. Students called the customer service number to ask questions about fees and then used the cards to call friends or family in Spain, Mexico, Peru, Colombia, Argentina, and Guatemala. Many customer service representatives did not know the information or could not give an exact answer to questions about fees.

The actual cost of the card was the price paid divided by the number of minutes the students were actually able to use. This figure was compared to the expected cost, which was calculated by dividing the price of the card by the number of minutes that the student was told he/she had when the card was first used. On average, the actual cost per minute was 87% higher than the expected cost per minute. This study confirms consumer complaints about prepaid phone telephone cards.

One implication of the research is that consumers need to be aware of hidden charges. Another implication is that consumer protection efforts could be implemented or strengthened. Government protection could mandate disclosure information so that consumers would know what fees are charged before they purchase the cards.

Analysis of Pax6a Expression Using a BAC Transgene

Anjali Chaudhari, Jorn Lakowski and Dr. James D. Lauderdale, Department of Cellular Biology, University of Georgia

The Pax6 gene encodes a paired-box transcriptional factor necessary for development of the eye, brain, spinal chord, and endocrine pancreas in vertebrates. In contrast with other mammals and birds, zebrafish have two Pax6 genes, designated Pax6a and Pax6b, which are thought to have originated as the result of a genome duplication in the fish lineage. In current models of genome evolution, duplicated gene pairs may be retained if (1) one member of a pair acquires a new function or (2) the regulatory elements of the ancestral genes are divided between the duplicates such that expression of both is required to perform ancestral gene function. We hypothesize that Pax6a and Pax6b have been retained in zebrafish through the latter mechanism. As a first test of this idea, our lab has taken a transgenic approach in which a Pax6a BAC (Bacterial Artificial Chromosome) containing the green fluorescent protein as a reporter was introduced into

zebrafish embryos using microinjection techniques. Microinjection involves injection of DNA into a recently fertilized egg with a capillary needle and then allowing the embryos to develop. To identify the fish with the transgene, I screen for EGFP fluorescence, which is then compared to endogenous Pax6a expression pattern. Transgenes that reproduce Pax6a expression pattern will be used in future experiments testing the function of further regulatory elements.

Creating Expressed Sequence Tags of Human Embryonic Stem Cells

Disha Chhabra
Dr. Lee Pratt, Department of Plant Biology, University of Georgia

The purpose of this project is to use Expressed Sequence Tag (EST) sequencing to amplify and identify expressed genes in embryonic stem cells. The genes were isolated from the MedII induced differentiation of the inner cell mass to an early neural progenitor cell type. EST sequencing is a process that allows expressed genes in particular tissues or cell types to be identified through the utilization of complementary DNA (cDNA) libraries. These cDNA libraries are compiled through the reverse transcription of mRNA derived from an organism's cells. The transcribed cDNA is ligated into a plasmid vector of known sequence. Numerous plasmids, all containing different cDNA sequences, are inserted into separate *Escherichia coli* cells, which are then allowed to replicate. The plasmids are isolated from the bacterial cells and purified in a three day process after which each cDNA is sequenced from the 3' and 5' ends. Next, the sequences are analyzed for quality. The qualifying sequences are submitted into a database to be compared with other identified sequences. In this project, 29 novel genes were identified and a total of 3,714 genes were sequenced. Once the expressed genes are identified, they can be studied for their protein expression and possible theraputic opportunities. The novel cDNA clones containing full length open reading frames will be submitted to the Mammalian Gene Collection. The cell extracts are provided to the National Cancer Institute (NCI).

Inhibition of Corticotropin-releasing Factor Receptors during Repeated Restraint Reduces Hyperresponsiveness to a Subsequent Stressor

Christina Chotiwat, Tiffany D. Mitchell, and Dr. Ruth Harris, Department of Foods and Nutrition, Medical College of Georgia

Acute stress induces many neurological and physiological changes including a long term increase in sensitivity to subsequent stress. This hypersensitivity is characterized by exaggerated release of the stress hormone, corticosterone. The neurotransmitter corticotropin-releasing factor (CRF) inititiates responses to stress through CRF receptors (CRFR) and the corticosterone response is believed to be primarily controlled by CRFR1. Previous studies have shown that rats exposed to 3 hours of restraint for 3 consecutive days exhibit an exaggerated corticosterone response to a subsequent novel mild stress. Therefore, we hypothesized that antagonism of CRFR immediately before restraint would block the elevated corticosterone response to the mild stress. Here we determined the effect of selective CRFR1 or non-selective CRFR1 and CRFR2 antagonism during restraint on corticosterone concentrations in rats subsequently exposed to the novel mild stress of an intraperitoneal saline injection and housing in a new room. Rats received third ventricle infusions of 5□g αhCRF-(9-41), a non-selective CRFR antagonist, or subcutaneous injection of 5mg/kg NBI 27914, a selective CRFR1 antagonist, immediately before restraint on each day of restraint. In response to the mild stress administered 12 days later, restrained rats treated with αhCRF exhibited a lower corticosterone response than restrained rats treated with vehicle while rats treated with NBI 27914 were not different from their vehicle-treated controls. These data show that CRFR1 are not primarily responsible for initiating the long-term, stress-induced increased sensitivity to mild stress.

The Role of Angiogenic Factors in Vessel Formation

Amy Chudgar
Dr. Brenda Lilly, Vascular Biology Center, Medical College of Georgia

Blood vessel formation or angiogenesis is a multi-step process that requires the precise orchestration of cell proliferation, migration, and communication. An important initial event in angiogenesis is the joining of endothelial cells into cord-like structures that ultimately form tubes containing an inner lumen, and a surrounding basement membrane. The signaling mechanisms through which endothelial cells coalesce into intact blood vessels are complex, and not completely understood. Therefore, the goal of the study was to further define the mechanisms that promote vessel formation by evaluating angiogenic factors that have been implicated in the assembly of blood vessels. A three-dimensional collagen gel assay system in which endothelial cells form intact vessel was employed, and by the addition or depletion of select molecules, the importance of angiogenic factors for the formation of blood vessels was assessed. The results indicate that the phorbol myristate acetate (PMA), an activator of protein kinase C (PKC), augments vessel formation, and further that vascular endothelial growth factor (VEGF) is sufficient for vessel assembly. The data also demonstrates that angiopoeitin-1 (Ang-1) enhances vessel formation. These studies demonstrate the dependence of endothelial cells on multiple signaling pathways for vessel formation and suggest that individual angiogenic factors have unique roles in angiogenesis.

Exploration and Manipulation of Objects and Surfaces by Common Chimpanzees (*Pan troglodytes*) and Capuchin Monkeys (*Cebus apella*)

Collin Closek and Sarah Kilgore
Dr. Dorothy Fragaszy, Department of Psychology, University of Georgia

Human infants modify their manual actions in accord with the physical properties of objects and/or surfaces they explore, and they use objects to explore surfaces. These characteristics of action are thought to support the development of tool use. Do nonhuman animals also tailor their actions to the properties of surfaces and objects they explore, and do they use objects to explore surfaces?

This study investigated exploratory activity in eight capuchin monkeys (*Cebus apella*) and four chimpanzees (*Pan troglodytes*), all adults. Our work investigated two hypotheses: both chimpanzees and capuchins will explore surfaces in accord with the differential properties of the cubes and they will display distinct differences in exploring actions. Testing involved presenting one of four surfaces (wood, sponge, water, and netting) and one of two cubes (sponge, wood) for one minute. We scored from digital video the individuals' behavior with surfaces and cubes, with special attention to actions combining the cubes with the surfaces, for example banging, rolling and pushing the cube on the experimental surface or elsewhere. Like human children, (a) both species contacted the surfaces using the objects (for example, placing the cube on the experimental surfaces, and tapping or rolling it across the surfaces), and (b) both species differentiated actions combining the cubes with different surfaces. Chimpanzees performed more actions overall and a greater variety of actions with the cube on the surfaces. The data suggest that both capuchins and chimpanzees spontaneously explore their world in ways supporting the development of goal-directed action with objects (i.e., tool use). Differences between the genera in exploration match known differences in manual behavior, including tool use, in wild individuals. Further comparative work can establish if these characteristics of action are more elaborated in genera that routinely use tools compared those that do not.

Blockade of Cannabinoid Receptors in the Basolateral Nucleaus of the Amygdala Suppresses Stress-Induced Analgesia

Katherine Connell, Dan Olsen, Nathan Bolton and Dr. Andrea G. Hohmann, Neuroscience and Behavior Program, University of Georgia

Exposure to stress activates neurotransmitter systems in the brain that serve naturally to suppress sensitivity to pain. This phenomenon,

termed stress-induced analgesia, refers to an absence of pain sensation without loss of consciousness induced by exposure to a stressor. The brain's own marijuana-like chemicals, the endocannabinoids, act in the nervous system to suppress pain. SR141716A, an antagonist for cannabinoid receptors, interferes with the physiological actions of naturally existing endocannabinoids in the brain by blocking cannabinoid CB1 receptors that are located in the central nervous system. The present study was conducted to evaluate the site of action of endocannabinoids, for mediating stress-induced analgesia. We tested the hypothesis that microinjection of the CB1 antagonist SR141716A into the basolateral nucleus of the amygdala (BLA), a brain region implicated in stress, would suppress the stress-induced analgesia. Stress-induced analgesia was invoked in male Sprague-Dawley rats by exposing them to inescapable electric foot shock for 3 minutes. Immediately after exposure to the stressor, the latency for rats to withdraw their tails from a radiant heat source was measured. Increases in tail-flick latency following exposure to the stressor indicate the appearance of stress-induced analgesia. We predicted that blockade of cannabinoid neurotransmission in the BLA following local injection of SR141716A would reduce stress-induced analgesia relative to control rats. Rats microinjected with SR141716A in the BLA showed marked reductions in stress-induced analgesia relative to the controls. This observation provides further evidence that endocannabinoids act at CB1 receptors in the BLA to mediate analgesic effects of stress. These findings can serve as a basis for further understanding the neurochemical pathways of the cannabinoid transmitter system.

Effects of Shared Environment during Development on The Adult Behavior of *Drosophila paulistorum*

Paul Courtwright
Dr. Yong-Kyu Kim and Dr. Wyatt Anderson,
Department of Genetics, University of Georgia

Many psychological literatures have shown the effect of shared environment during early childhood on the adolescence's behavior utilizing twin and adoption studies. Our previous work has demonstrated that early association and familiarity reduce sexual attraction between siblings who have been raised together during early lifetime and thus they avoid mating with each other. Subsequently, we have studied the effect of shared environment with non-siblings on adult *Drosophila* behavior following the adoption studies in humans. Using an isofemale line of *D. paulistorum*, single pairs of sexually mature virgin flies were individually placed in vials containing food and were transferred into new vials daily. To reduce any effect of density during early development on the mating behavior of adults, 20 eggs were collected and placed in each vial. All siblings in the same vials from the same mothers were named Sibling Raised Together Communally (SRTC). One offspring from each of the different mothers was collected and raised together with other offspring, which were termed Nonsibling Raised Together Communally (NSRTC). These NSRTC flies were again regrouped into 6 treatments (NSRTC1, NSRTC2, NSRTC3, NSRTC4, NSRTC5, NSRTC6) depending on each of the six developmental stages at which they began having contact with nonsiblings. Then we observed the effect of this early association with nonsiblings on mating behavior at the adult stage. Pairs of 5-9 day old NSRTC flies were individually introduced into mating chambers. Observation continued for 10 min or until mating occurred. Courtship latency, courtship duration, and copulation duration were recorded and courtship index (CI) was measured. My current data show that there was no correlation between the lengths of contact with nonsiblings during development and courtship indices; the effect of early association with siblings before adoption was stronger than that of non-siblings.

Maintenance of Antigen-Specific CD8+ Memory T Lymphocytes in Experimental *Trypanosoma cruzi* Infection

Matthew T. Crim
Rick L. Tarleton, Department of Cellular Biology, University of Georgia
Diana L. Martin, Center for Tropical and Emerging Global Diseases, University of Georgia

Trypanosoma cruzi is the causative agent of Chagas disease, a condition affecting 16 to 18 million people and causing 50,000 deaths each year in Central and South America. A mouse model mimics human infection, as parasite persistence in muscle tissue is common in both mice and humans. Studies in gene-knockout mice have demonstrated the importance of CD8+ T lymphocytes in the concerted immune response to combat infection. CD8+ T cells respond to pathogen-derived peptides presented by the major histocompatibility complex (MHC) I. Previous studies reveal that one of these peptides, altered peptide ligand (APL) 20 (ANYKFTLV), is a target of CD8+ T cells during *T. cruzi* infection. Clonal expansion of antigen-specific CD8+ T cells in response to a foreign antigen is followed by the apoptosis of most of the population, but a small portion survives as memory cells. B-cell Lymphoma - 2 (Bcl-2) is an anti-apoptotic integral membrane protein localized in the outer mitochondrial membrane that prevents caspase activation. Up-regulation of Bcl-2 is linked to the survival and maintenance of antigen-specific CD8+ T cells. The importance of this mechanism in experimental *T. cruzi* infection is being examined by flow cytometric analysis of fluorescence-conjugated antibodies. It is expected that Bcl-2 will be up-regulated in APL20-specific CD8+ T cells. In order to examine the homeostatic proliferation kinetics of antigen-specific CD8+ T cells, the incorporation of bromodeoxyuridine (BrdU), a thymidine analogue, during the synthesis phase is also being examined by flow cytometric analysis.

The Role of Autophagy in Neurodegenerative Disease

Caelin Cubenas, Dong-Hwan Kim, Dr. Ruth Furukawa, Dr. Marcus Fechheimer, Department of Cellular Biology, University of Georgia

Brain autopsy specimens from patients with neurodegenerative diseases contain hallmark pathological inclusions characteristic of each disease. A few examples of inclusions are Lewy bodies in Parkinson's disease, tau tangles and amyloid plaques in Alzheimer's disease, and Hirano bodies in numerous diseases. The physiological role and mechanism of toxicity of these inclusions is controversial and not fully understood. Previous studies as well as preliminary data from the slime mold *Dictyostelium discoideum* indicate that large inclusions can be cleared from cells by autophagy. Autophagy is a cellular pathway used to degrade large organelles that are damaged during aging or to recycle nutrients during starvation. This study will determine if autophagy plays a role in the degradation of model Hirano bodies in HR131 cells, which are *Dictyostelium* lacking an essential autophagy gene. Model Hirano bodies are cytoplasmic inclusions of paracrystalline actin arrays formed in vitro by expression of mutated forms of the 34 kDa actin bundling protein. Expression of the mutated and wild type 34 kDa protein fused to the enhanced green fluorescence protein will be controlled by folate. A fluorescence assay will be used to measure the rate of degradation of Hirano bodies. If autophagy is found to be essential to the degradation of these cytoplasmic inclusions, then pharmacological agents that stimulate autophagy may be developed in future studies as novel treatments for patients with neurodegenerative diseases.

The Effect of Different Bifunctional Linkers on Biological Activity of Functionalized Silicon Nanorods for Glucose Sensors

Sita Damaraju
Dr. William S. Kisaalita, Department of Biological and Agricultural Engineering, University of Georgia

There is a need for sensors to continuously monitor blood glucose for diabetic patients.

Such glucose sensors should be robust and stable in sensitive environment, i.e., inside the body. Nanotechnology is being used to develop implantable glucose sensors. Silicon nanorods were fabricated by the electron beam technique of glancing angle deposition (GLAD). These structures were then activated by linking enzyme to the nanorod surfaces. The effect of using different chemical linkers in the activation process was investigated. The enzyme, glucose oxidase (GOD), was used and assayed by absorbance at 450nm based on a series of reactions involving the oxidation of o-dianisidine. Four different chemical linkers were used: glutaraldehyde, 1% Polymaleic anhydride (PMA) solution in toluene, 5% Polymaleic anhydride (PMA) solution in acetone, and N-5-Azido-2-nitrobenzoyloxysuccinimide (ANB-NOS). The process with each linker was repeated six times. Based on these results, glutaraldehyde was 6-20 times better than the other linkers.

A Comparison Among Three Methods to Detect Newcastle Disease Virus in Formalin-fixed, Paraffin-embedded Tissues

Taylor Deal
Dr. Corrie Brown, Department of Veterinary Pathology, University of Georgia

Newcastle disease, caused by infection of Newcastle disease virus (NDV), is one of the most important avian diseases because of its economic impact on the poultry industry. The clinicopathologic lesions of this disease are varied and are no specific. Thus, immunohistochemistry (IHC) and in situ hybridization (ISH) have been used to detect viral infection in formalin-fixed, paraffin-embedded tissues. As an additional method, we developed the method of reverse transcription polymerase chain reaction (RT-PCR) of the matrix gene (232-bp) with formalin-fixed, paraffin-embedded tissues, and the sensitivity was compared to those of IHC for viral nucleoprotein and ISH for the matrix gene (850-bp). The tissues (spleen and lung) were collected from 4-week-old chickens experimentally infected with two NDV isolates, an avirulent virus (LaSota) and a virulent virus (from a 2002-2003 California outbreak). For RT-PCR, RNA was obtained from these tissues by digestion with proteinase K and subsequent extraction with phenol, chloroform, and isoamyl alcohol. The IHC and ISH were performed on 3-µm paraffin-embedded tissue sections. The RT-PCR with formalin-fixed, paraffin-embedded tissues was found to be an effective and sensitive method to detect NDV. All samples from infected chickens were positive by RT-PCR, including samples which were negative by both IHC and ISH. Therefore, RT-PCR is also a possible method to be utilized to do retrospective diagnosis of Newcastle disease in fixed tissues as well as IHC and ISH.

Establishing Mammalian Cell Lines that Modulate O-linked N-Acetylglucosamine, O-GlcNAc, levels to Characterize Its Role in Apoptosis and Insulin Action

Anjan Deka
Dr. Lance Wells, Complex Carbohydrate Research Center, University of Georgia

The post-translational modification of proteins with beta-O-linked N-acetylglucosamine, O-GlcNAc, occurs on many nucleocytoplasmic proteins, including transcription factors, hormone receptors, and viral proteins. The enzymes for the addition and removal of O-GlcNAc are O-GlcNAc transferase, OGT, and O-GlcNAcase. O-GlcNAcase is cleaved into its N-terminus and C-terminus by the enzyme Caspase-3, an executioner protease in apoptosis. Apoptosis, or automated cell death, has proven to be especially important in Type II diabetes and cancer. Recent research has shown that O-GlcNAcase remains active in its removal of O-GlcNAc following cleavage by Caspase-3. In addition, previous research has shown that the active site of O-GlcNAcase in its removal of O-GlcNAc lies in the N-terminus. With this information, the goal of the research project was to more carefully characterize the activity of O-GlcNAcase in mammalian cell lines. Bacterial transformation, nickel-column purification, and activity assays were used to verify the expression and activity in the N-terminus. Vector transformations were used to make the N-terminus available for transfer into mammalian cell lines. Transiently transfected cell lines are currently being tested for

sensitivity to apoptotic stimuli, the levels of O-GlcNAc, and insulin sensitivity. We predict that overexpression of O-GlcNAcase will lower O-GlcNAc levels and protect cells from apoptotic stimuli and the induction of insulin resistance. This work will aid in the fight against cancer and Type II Diabetes.

Microarray and qRT-PCR Analysis of Gene Expression in CD8+ T Cells from *T.cruzi* Infected Mice

Amanda L. Dempsey
Dr. Rick Tarleton, Department of Cellular Biology, University of Georgia

Trypanosoma cruzi, the agent of Chagas disease is estimated to infect 16 to 18 million people resulting in an estimated 50,000 deaths yearly. The infection is generally chronic in nature with parasite persistence. Functional CD8+ T cells produce the cytokine interferon gamma (IFNg), which is crucial for parasite control. However CD8+ T cells isolated from muscle of *T. cruzi*-infected mice are hyporesponsive for IFNg production compared to T cells from the spleen. It is hypothesized that changes in gene expression are directly related to "muscle" T cell hyporesponsiveness. Our aims were to (I) assess expression of genes with known immunological importance in splenic and muscle derived CD8+ T cells from infected mice and (II) compare the kinetics of gene regulation in T cells from spleen and muscle following in vitro stimulation. Microarray analysis of total RNA from unstimulated splenic and muscle derived CD8+ T cells of naïve, acute and chronically infected mice was conducted using an array of 500 mouse genes. These data were then clustered to create an in vivo time course gene regulation profile. Likewise, microarray analysis was performed using RNAs from in vitro stimulated (0hr, 4hr, 16hr) splenic and muscle CD8+ T cells from chronically infected mice. Genes upregulated in muscle T cells compared to splenic T cells include Fas-ligand, granzyme-B and interferon-beta, which suggests possible roles for these genes in muscle T cell hyporesponsiveness. The regulation of selected genes identified by microarray analysis is currently being evaluated by quantifiable real time PCR.

The Artist in Cuba

Lauren Domenick
Dr. Dana Bultman, Department of Romance Languages, University of Georgia
Prof. Judy McWillie, Lamar Dodd School of Art, University of Georgia

Having traveled to Cuba through the UGA program in Visual Arts, I was struck by the inviting nature of the people and their amazing ability to absolve an American of the sins that he or she is inherently tied to by the acts of his or her government. I traveled to learn about a people and a culture that stunned me with warmth and optimism despite Cuba's physically decaying and ideologically stagnant state. It is the Cuban sense of resilience and determination and pride that has preserved and upheld the integrity of the nation and it is this integrity that I wish to communicate to people here in the United States. After having spent time in Cuba and researched its political and artistic history, I wish to maintain a correspondence and ongoing dialogue with artists in Cuba through sources that are available to them, to which the extent may be letter writing and telephone conversation, if feasible. I am going to use my research to create a new pathway that allows the exchange of ideas between citizens of the United States and Cuba, with sensitivity to the fissures in the political relationship of our two nations that stigmatize and jeopardize an intellectual and artistic relationship. I am going to foster this dialogue through conversation with Cuban artists inside and outside of their country that explores the daily concerns of Cuban people and that will ultimately result in a sculptural artifact of my creation that expresses the Cuban people to Americans in humanistic terms rather than in political terms.

Alternatively Spliced Transcripts of Matrix Metalloproteinase-2 in Ovarian Cancer Cells.

John DuVal, Susanne Warrenfeltz, Dr. David Puett, Department of Biochemistry and Molecular Biology, University of Georgia

In a tightly regulated process, ovarian matrix metalloproteinase-2 (MMP2) is activated during ovulation by gonadotropins. Under normal conditions, proteolytic degradation of the

basement membrane during ovulation allows release of the mature oocyte to be freed from the basement membrane allowing its migration. However, over expression of MMP2 has a positive correlation with the development and progression of cancer. Since differences in the distribution of splice variants between pre-neoplastic and ovarian cancer cells may represent a molecular marker for ovarian cancer or an element of the mechanism for transformation from a pre-neoplastic cell to a cancerous cell. The goal of this project is to identify and characterize alternate transcripts of MMP2 in pre-neoplastic and transformed ovarian cancer cells. Alternatively spliced transcripts of MMP2 are being identified through Reverse Transcriptase Polymerase Chain Reaction, a process which allows for amplification of specific genetic sequences, from three ovarian cell lines: pre-neoplastic (IOSE-398) and two ovarian cancer cell lines (SKOV3 and OVCAR3). Specific transcripts will be amplified by designing primers which only bind to splice junctions allowing a search for all single exon deleted variants in the three cell lines allowing for confirmation of MMP2's presence in ovarian cancer and possible transcripts which may be present in certain cancers.

Laplace Force During Wetting of Vertically Aligned Nanorod Array

Dustin Dyer
Dr. Guigen Zhang, Department of Agricultural and Biological Engineering, University of Georgia

Vertically aligned nanorods have been incorporated into biosensors to increase the sensors' sensitivity since the increased surface area due to the nanorods provides additional active surface to secure the target molecules. Higher sensitivity is desirable because it increases precision and allows the detection of smaller concentrations. This technology can be applied to improve the effectiveness of existing biosensors such as those used in environmental, healthcare, and antiterrorism applications. Vertically aligned silicon nanorods created by vapor deposition have shown widespread deformation upon exposure to a water droplet. This presents a problem since many biosensors would likely be used in aqueous mediums. Such deformation is due to Laplace capillary forces caused by the nanorod-water interaction during the spreading of water through the nanorods. This study attempts to quantify the maximum amount of force water places on the nanorods by performing a series of Finite Element Analyses (FEA) using a beam model of an individual nanorod. Each analysis places a horizontal load at a different point along the vertical axis of the nanorod model. This load is increased in magnitude until the model reaches yielding. The maximum force and horizontal displacement at yielding was tabulated for each location. This displacement data was then compared with the observed residual deformations of the nanorods. With this information, we determine that the maximum amount of capillary force created by the water silicon-nanorod interaction is approximately 50 nN. This knowledge can be used to create mechanically stronger nanorods which should be designed to withstand at least this amount of force.

Undergraduate Psychology Majors: Perceptions and Initial Interests

Matthew Evans
Catherine L. Packer, Joy K. Harden, Deryl F. Bailey, Catherine Callender, and LaKeisha S. Gantt, Dr. Rosemary E. Phelps, Department of Counseling and Human Development Services, University of Georgia

On many college and university campuses, psychology is a high demand and popular undergraduate major. There is limited information available on how undergraduate psychology majors initially acquire information about psychology or what factors contribute to their career decision-making process. Findings can provide important information in helping psychology faculty better understand the needs and career concerns of undergraduate psychology majors. This study examined (a) how undergraduate psychology students develop an interest in psychology as a major, (b) how their perceptions of psychology change, (c) how they identify with the psychology profession, and (d) what are their career aspirations. The study sought to determine whether differences

would be found based on type of institution (i.e., liberal arts institution; doctoral-degree granting research institution).

Ninety-eight full-time undergraduate psychology majors at two state-supported, southeastern institutions participated in this study. Participants completed a demographic questionnaire, the Undergraduate Majors Questionnaire, and the Myers-Briggs Type Indicator – Form M.

Several significant findings based on type of institution were found. When undergraduate psychology majors first became interested in psychology, the extent to which participants' views and understanding of psychology changed, and plans to pursue a career in psychology differed based on type of institution. Students attending the liberal arts university became interested in psychology during their first two years of college, their views of psychology changed a great deal while in college, and more of them planned to pursue a career in psychology. On the other hand, participants at the research university first became interested in psychology in junior high school, their views changed only somewhat in college, and more of them were uncertain about pursuing a career in psychology at this time.

Expression of *Magnaporthe grisea* Extracellular Proteins in a Modified *Pichia pastoris* Expression System

Linda Fernekes
Dr. Sheng-Cheng Wu, Complex Carbohydrate Research Center, University of Georgia

Magnaporthe grisea is the causal fungal agent of rice blast disease responsible for the annual loss of 200 million tons of rice output worldwide. Under various growth conditions, *M. grisea* secretes a large number of extracellular proteins (ECPs), presumably required for growth, development, pathogenicity, maceration of host cell walls, and molecular signaling. A number of genes encoding ECPs have been previously identified using proteomics and bioinformatics technologies. In order to dissect their biochemical and biological functions, sufficient amount of pure ECPs will have to be obtained. This research established a modified procedure for expressing ECP-Myc-(His)6 fusion proteins in the heterologous yeast-like organism, *Pichia pastoris*. Gene fragments encoding six secretive xylan-degrading enzymes and two ECPs of unknown function were amplified by PCR and cloned into an expression vector, pPicH. Then, the constructs were transformed into *Pichia* cells, resulting in expression and secretion of at least three ECP fusion proteins in the culture media. Enzyme assays, gel electrophoresis and immuno-blotting analysis were used to confirm the authenticity of the expressed proteins. Finally, the expressed proteins are being purified from the culture filtrate by affinity chromatography using a nickel-containing resin column.

Production of Antibodies to Erythrocyte Invasion Proteins of *Plasmodium falciparum* and Their Use to Investigate Erythrocyte Invasion

Edmund Fomunung
Dr. David Peterson, Department of Medical Microbiology and Parasitology, University of Georgia

With the increasing number of deaths and growing resistance of the malaria-causing parasite to the available drugs, there has been a steady increase in research aimed at understanding this parasite. The goal of this research is to study certain proteins, in the Ebl 1 family, which are believed to be crucial for the invasion of red blood cells by this parasite. The expression of these erythrocyte-binding proteins will be studied in different parasite isolates. This will require the development of antibody reagents to detect these proteins. To that end, portions of specific proteins, JESEBL, EBA 175, BAEBL and EBL1, will be expressed in *E. coli*. The approach used is to clone the genes into the vector pGEX to provide for inducible expression and a means to affinity purify the expressed proteins. PGEX is a Glutathione S Transferase(GST) fusion protein system wherein genes are cloned into the vector to provide for high level protein expression in the *E. coli*. The GST fusion proteins can then be affinity purified on glutathione sepharose, which has a high affinity for GST. pGEX recombinants are

currently being screened on both a small scale- to verify protein production- and large scale-to obtain significant quantities of purified protein. In the future, these purified proteins will be used to produce antibodies for analysis of the expression of the erythrocyte-binding proteins. One such analysis includes using antibodies to determine the location of these proteins on merozoites. The location can help determine the precise roles of these proteins in erythrocyte invasion.

Gender Differences in 360-degree Feedback Related to Leader Effectiveness

Kate Fuller, Lauren Killion, and Liz Scharlau
Dr. Karl Kuhnert, Department of Psychology, University of Georgia

Leadership in the workplace is a key focus in industrial/organizational psychology. In this study, we examined differences in leadership styles across genders to identify differences between male and female business leaders. To compare effectiveness across gender, we used data collected from over 100 executives. The data collection method was 360-degree feedback with additions including self-report, customer ratings, and other ratings of the executive. We studied gender differences across individual leadership qualities, divided into eight leadership categories. Previous research found correlations between gender-stereotypical leadership styles and leadership effectiveness, but did not look at specific leadership qualities. We predicted women to surpass men on qualities related to participative leadership, including catalyzing teams, cultivating and retaining talent, and contextual grounding. Furthermore, we predicted men to excel on measures related to directive leadership, including managing performance, leading change, and creating a compelling vision. The goal of this research is to explain the gender differences in leader effectiveness ratings and to find ways to maximize leader effectiveness in the workplace for both genders. Additionally, findings from the research will help promote gender equality at work.

The Substrate Specificity of Rce1p

Tiffany Gartrell
Dr. Walter Schmidt, Department of Biochemistry & Molecular Biology, University of Georgia

The Rce1 protein is a membrane bound protein located in the endoplasmic reticulum. It plays a crucial role as a protease in the formation of mature Caax proteins such as yeast a-factor and mammalian Ras. These two proteins are important in cell signaling processes. The Caax motif consists of a cysteine, two aliphatic amino acids, and the last amino acid can be any amino acid. Proteins terminating in a Caax motif are modified at their carboxyl-termini in a sequential three-step process consisting of isoprenylation (farnesylation or geranylgeranylation), proteolysis, and carboxylmethylation. Rce1p along with the protease Ste24 (Afc1) specifically cleaves the aax portion of the a-factor Caax motif (CVIA). Further modification of Caax proteins leads to mature a-factor and Ras. Ras is an oncogene, and an important protein in cancer research. Mutations in the Ras gene, may cause the protein to loose its GTPase activity which leads to Ras being constantly in its active state. With a constantly active Ras, cell growth is uncontrolled which can lead to cancerous cells. The only inhibitors designed to block Ras maturation prevents the farnesylation of Ras. The negative side of these inhibitors, is that the Ras protein is not the only Caax protein inhibited from farnesylation. There might be other important Caax proteins that are being affected by these inhibitors. The inhibitors lack substrate specificity, and this is where the knowledge of Rce1p substrate specificity may be important. Ste24p and Rce1p are proposed to cleave distinct populations of Caax proteins. For example, Ras is exclusively cleaved by Rce1p. If all the substrates of Rce1p were known, then the potential side effect of Rce1p inhibitors could be evaluated. In this study two approaches were taken to determine the possible substrate specificity of Rce1p. The first approach used an anti-farnesylated cysteine antibody. Yeast a-factor from *Saccharomyces cerevisiae*, was used to analyze the farnesylated cysteine antibody. The antibody was suppose to

recognize methylated and unmethylated Caax proteins, and should not recognize unmodified Caax proteins. Consequently in a yeast strain that only has Rce1p, it should be able to recognize the various substrates that Rce1p was able to cleave. This part of the study was inconclusive, because the antibody was not specific to only Caax proteins. In the second approach the goal was to purify possible substrates of Rce1p. A group of Caax proteins were identified and recovered from a collection of GST fusion protein strains. All of the genes of yeast are known and a library of GST fusions was created that contained all of the yeast genes fused in frame to the C terminus of GST . The importance of using GST fusion proteins is that GST is a tag on the proteins that can be detected by anti-GST Western. The proteins were analyzed by SDS-Page and anti-GST Western to determine if the protein were produced and of the correct molecular size, before proceeding with purification This study was also inconclusive, because most of the GST-fusion proteins used in the study were either not detected or not of the correct molecular size.

Student Attitudes Concerning Abortion

Mary Gassama
Dr. James Bason, Survey Research Center,
University of Georgia

Young people have traditionally been considered apathetic concerning political participation. During the 2004 election year, there was much anticipation that most young people would vote due to the Vote or Die campaign sponsored by P. Diddy and other notable stars. However, although the number of young people who did vote increased, it was much less than the expected number. Despite low levels of political participation by the young, the young may still exhibit saliency towards other political issues. This research will examine attitudes of the young toward a more volatile issue, the abortion issue.

Data utilized in the study were collected from a random sample of 410 University of Georgia students who participated in a web based survey during November of 2004. Participants in the study voluntarily responded to a 40 items survey via an email invitation to participate in the study. Estimates from a sample of this size are subject to a sampling of error of +/- 5.0% at the 95 percent confidence interval. The response rate for the survey was 21.0%.

I hypothesized, based on a general level of apathy among the young, that University of Georgia students will not hold intense views on the abortion issue. However, I do expect both political affiliation and gender to be related to attitudes towards abortion. Contrary to my hypothesis, however, the results of the survey indicate that most students do have opinions about abortion. The data collected shows that there is a statistically significant relationship between political affiliation and attitudes towards abortion. However, no significant differences in attitude toward abortion were observed with regard to gender.

Economic Freedom and Its Impact on Standard of Living

Lindsey Giffin
Dr. David Mustard, Department of Economics,
University of Georgia

Economic freedom is a measure of the ability to conduct commerce in a free market environment under the protection of secure property rights and with minimal government interference. An abundance of research has shown that economic freedom increases economic growth. These studies have two primary limitations. First, they provide little information about how economic freedom affects a broader array of standard-of-living measures. Second, most studies examine only the static differences across countries with varying degrees of economic freedom. This study contributes to the literature by addressing each of these concerns. This paper examines the effects of changes in economic freedom, as measured by the Fraser Institute's Economic Freedom of the World Report, on a variety of standard of living variables, as measured by the World Bank's World Development Indicator. To identify these effects I used multivariate regression analysis that controls for other factors that could influence my outcome variables. The data are from a repeated cross section of nations between 1980 and 2001, a 21-year period when

many nations were undergoing fundamental changes in the extent to which they permitted economic freedom. Findings indicate that, in general, countries that increased economic freedom also experienced an increased standard of living. As globalization has increased the potential for development in many nations, economically free institutions are essential for taking advantage of this opportunity to improve the lives of citizens of developing countries.

Ethnomusicology and the Theory of Race: A Brazilian Case Study

Daniel Gough
Dr. Jean Kidula, School of Music, University of Georgia

The history of the concept of race within the theoretical framework of ethnomusicology is, at the very least, incredibly complex. However, until the last several decades, the role of race in ethnomusicology was not seriously examined. Taking cues from such areas as black cultural and literary criticism, ethnomusicologists now debate the validity of the use of Enlightenment reason, Afro-centrism, and a host of other viewpoints in the analysis of race in music. Nonetheless, much of the scholarship dealing with race and music has focused its attention on blacks in Africa, North America, and the Caribbean. Interestingly, the world-renowned Afro-Brazilian music scene in Salvador, Brazil (a nation that holds a very important place in the discussion of race in other social sciences), has been notably absent from these theoretical conversations. This paper will examine the intellectual history of the issue of race within the field of musicology as well as contemporary Afro-Brazilian music making in Salvador. By discussing how current theories of race can be applied to today's music making in Salvador, I hope to demonstrate the location of Afro-Brazilian musical experience in relation to this extant theoretical framework.

The Effect of the North American Beaver (*Castor canadensis*) on Riparian Vegetation along Sub-Antarctic Forested Streams in the Tierra del Fuego/Cape Horn Region of Chile

Clayton R. Griffith, Christopher B. Anderson, and Dr. Amy D. Rosemond, Institute of Ecology, University of Georgia

The North American beaver (*Castor canadensis*) was introduced to Navarino Island, Chile in the 1960s, where they have been changing the structure and succession of the riparian, or bank side, vegetation community. We assessed these changes due to their importance in managing beaver effects on the remote and pristine sub-Antarctic forests of southern Chile. To quantify beaver effects on non-native, species-poor riparian vegetation, two sites (a beaver meadow and a natural forest reach) at four different streams were compared, measuring canopy cover, basal area, understory woody and herbaceous vegetation richness, and forest regeneration. Measurements for herbaceous plants were taken using twenty 0.5 m2 plots per reach and recording coverage and assemblage. In addition, ten 50 by 1m transects were set perpendicular to the stream to quantify woody plant characteristics. Beaver significantly reduced canopy cover and basal area in the beaver meadow sites (Tukey-Kramer $p<0.05$ up to 30 m). Moreover, herbaceous vegetation richness was greater in beaver meadow sites than natural sites ($p<0.0001$) and was also associated with an increase in exotic species. Understory woody vegetation in beaver meadows showed an increasing trend in richness and percent coverage when compared to natural forests, but it was not statistically significant. Regeneration of the two dominant *Nothofagus* trees was significantly reduced in the beaver meadow sites ($p<0.0001$), but *N.antarctica* actually increased ($p<0.0001$). Overall, beavers modified the ecosystem from a closed forest to an open meadow facilitating the disturbing effect of enabling a road of exotic plant species into the interior of the island.

Adolescent Vulnerability to Nicotine Addiction: a Biological Basis

Christopher Hale
Dr. Thomas F. Murray, Department of Physiology and Pharmacology, University of Georgia

Adolescence is a period of high vulnerability to nicotine addiction. This study uses an animal model of cigarette smoke inhalation to study the differences between adult and juvenile nicotine exposure. Previous studies employing infusion models of nicotine exposure suggest that the neural effects of nicotine exposure in juvenile rats are distinct from those seen in mature rats. Specifically, nicotinic acetylcholine receptor (nAChR) upregulation appears to be greater in juveniles than adults. However, infusion studies are not a realistic model of the fluctuating blood nicotine levels resulting from periodic smoking. In this study, sections were made from control, exposed, and post-exposed adult and juvenile rat brains. The magnitude of nAChR upregulation was assessed using [^{125}I]epibatidine receptor autoradiography. Cerebral cortical nAChR upregulation was not significantly different between juvenile and adult brains. However, the magnitude of nAChR upregulation in the nucleus accumbens (*N. accumbens*) was greater in the juvenile than in the adult brains. The $\alpha4\beta2$ nAChR subtype is particularly susceptible to nicotine induced upregulation, and the greater upregulation of [^{125}I]epibatidine labeled receptors in juveniles seen in this study could be due an enhanced adaptive responsiveness of the $\alpha4\beta2$ nAChR in the juvenile N. accumbens. The upregulation of presynaptic nAChRs due to nicotine exposure could lead to increased dopamine release in the *N. accumbens*. Increased dopamine release in the *N. accumbens* is one process that has been implicated in addiction. The greater magnitude of nicotine-induced nAChR upregulation in the juvenile *N. accumbens* observed in this study could be a biological mechanism underlying juvenile susceptibility to nicotine addiction.

Gas Phase Synthesis and Time of Flight Mass Analysis of Novel Semiconductor Clusters Containing Sulfur and Group Thirteen Metals

Phillip Benson Ham III
Dr. Michael A. Duncan, Department of Chemistry, University of Georgia

Semiconductor materials are integral to the electronics industry. The dimensions in microelectronic circuits have been shrinking systematically by a factor of two every six years. Extrapolating just to the year 2012 suggests future transistor widths of 35 nm, the size of a few atoms. Therefore, as these circuits continue to become smaller and more efficient, new materials are needed. Semiconductor clusters of gas-phase sulfur and group thirteen elements were produced and analyzed using a linear time of flight mass spectrometer. This was achieved by mixing metal powders, metal salts, or other materials with sulfur and covaporizing and ionizing the mixture with a laser that emits green light at 532 nm. The laser desorbs the mixture and electric fields accelerate the clusters through the time of flight chamber. The mass spectra obtained reveal that certain gas phase clusters form and are stable when they satisfy condensed phase electron counting rules. In particular, specific semiconductor sulfur clusters exist isoelectronic to forms dictated by Wade's electron counting rules. Also, the most stable clusters formed contained an even number of valence electrons, meaning that no radical clusters were present in high concentration. This gas phase correspondence in stability to condensed phase studies suggests that well-developed structure and bonding ideas can be applicable for understanding the stability and structure of gas phase semiconductor clusters.

Antibody Depletion of Highly-abundant Proteins in *T. cruzi* for Fine-tuning of Proteomic Analysis

Matthew Haney
Dr. Rick Tarleton, Center for Tropical and Emerging Global Diseases, University of Georgia

Chagas' disease, caused by the protozoan parasite *Trypanosoma cruzi*, is the world's

leading cause of congestive heart failure and a common cause of death in South America where 18 million people are infected and 90 million risk infection. Current treatments for *T. cruzi* are inadequate, and better understanding of parasite morphology could potentiate future treatments. Shotgun proteome analysis using liquid chromatography and tandem mass spectrometry has identified nearly 3,000 *T. cruzi* proteins from the four major life-cycle stages (Atwood et al, submitted). Unfortunately, nearly 50% of all mass spectra collected map to only 8% of the identified proteins. Therefore a limited number of high-abundance proteins are masking detection of low-abundance proteins. The goal then was to generate protein-specific antibodies that could bind to and remove the 67 high-abundance proteins, thus exposing low-abundance proteins to mass-spectrometric identification. Previous lab efforts have successfully cloned 54 of the 67 proteins. Cloning of the 13 remaining genes was thus undertaken utilizing PCR amplification and the Invitrogen Gateway® technology. Antibodies subsequently produced to these top 67 proteins in mice will then be used to deplete these high-abundance proteins from crude *T. cruzi* cell extracts from various life-cycle stages before mass-spectrometric analysis. The proteins identified by high-throughput proteomic analysis will verify *T. cruzi* gene annotations, identify new potential vaccine candidates, and further basic understanding of *T. cruzi* biology, hopefully leading to new and more effective treatments.

Implications of Unique Mineral Assemblages Associated With Subterranean Coal Fires

Matthew Hastings
Dr. Paul Schroeder, Department of Geology, University of Georgia

Subterranean coal fires are a little known phenomenon to most of the public, despite the fact that they pose a significant global threat to the environment. It has been estimated that subterranean coal fires, just in China, contribute as much as 3% of total world carbon dioxide production annually. It becomes apparent that to develop an understanding of how these fires will affect the global climate, it is important to know if and how coal fires affected the climate in the past. An unusual coincidence of this characteristic mineralogy in the geologic record could be evidence for past coal fires.

Using X-ray diffraction and electron microscopy, we are able to identify a mineral assemblage that is unique from all other known geologic environments. Samples were collected from the anthracite coal region surrounding Centralia, Pennsylvania. This accidental fire has been burning since 1961, and remains the largest coal fire in the United States. Analysis of the samples using XRD has shown that there are two common mineral assemblages: these include vapor deposited phases, and alteration minerals formed from the intense heat and chemical exposure. These deposits do not appear to have any effect on the relative amount of CO_2 that is emitted into the atmosphere, and the record of past coal fires could help to explain trends in global climate shifts if these deposits are found to coincide. Further work is needed to better constrain the mineralogy of these deposits and whether they are similar to those found in other locations around the world.

Rank, Ritual, and Akbar the Great

Chris Holland
Dr. Farley Richmond, Department of Drama and Theatre, University of Georgia

Upon the third Mughal Emperor of the Indian subcontinent, Akbar the Great's ascension to the throne at just thirteen years old, no one could have foreseen the great acts which would occur under his reign from 1562 to 1605 C.E. Early on he was instilled with two important qualities: the inclination to all religion and his need for understanding of the truth. The combination of the two led to the Muslim ruler to move away from the tradition of an orthodox-Mullah system of law, where the Mullahs (Muslim theologians) interpreted the Muslim law (Shari'ah) based on their "religious opinions," as Akbar referred to it. Akbar's new method of rule culminated in the 1579 issue of the mahzar commonly labeled the "Infallibility Decree." This decree recognized him as sole decision maker over his vast empire.

The primary objective of my research is to understand how Akbar consolidated vast regions, with very diverse cultural and religious differences, to claim allegiance solely to him. This is done through examining his Imperial bureaucracy, the Mansabdari System. Although this system of mansabs (rank holders) was part of an administration tightly binding them to the central government, it would not have worked unless there was some "cohesive glue" tying them personally to Akbar. This "glue" was imperial ritual which pervaded all aspects of life for the bureaucracy. The aim is to show the necessity of ritual in the rule of Akbar's empire. Research is conducted through thorough examination of primary and secondary sources.

Creating an Inexpensive and Fast Method for Screening Potential Drug Compounds for Narrow Spectrum Targeting of the Heme Biosynthetic Pathway

Catherine Hudson
Dr. Harry Dailey, Department of Biochemistry and Molecular Biology, University of Georgia

The threat of infectious disease is rapidly growing out of control globally. Compounding this problem is the increase in drug resistant micro-organisms due to overuse and improper use of current broad spectrum antibiotic methods. Our research goal is to create a relatively quick and inexpensive method for screening a large number of drug compounds for their efficacy as narrow spectrum antibiotics. Specifically, we hope to determine and create antibiotics that will negatively affect the heme biosynthetic pathway in bacteria. Because heme is an important cofactor in many life processes, the targeting of this pathway will yield a very effective antibiotic. Our research focuses on four enzymes of the heme pathway that are dissimilar in bacteria and humans. We have created a library of mutant *Escherichia coli* that have one of the four genes of interest knocked out and replaced with a selective antibiotic resistance gene. In addition to this library, we have taken these mutants and transformed into them a low-copy vector containing the human analog of the replaced gene. The possible drug compounds will first be tested on wild-type bacteria to determine their efficacy in negatively affecting heme biosynthesis. After this initial screen, the possible compounds will be tested on the knockout mutants to determine narrowness of target of the single enzyme of interest. Compounds passing this screen will then be tested on the knockout mutants containing the human analogs in order to rule out possible toxicity to humans. This method that we have created will yield useable results with minimal cost and effort.

Comparing Voting Behavior of University of Georgia Students and Georgia Residents in 2004

Jamarri J. Ivy
Dr. James Bason, Survey Research Center, University of Georgia

A 2004 poll by Harvard's Institute of Politics concludes that college students favor Democrat John Kerry over Republican George W. Bush by a much larger margin than the public at large, with as much as 52 percent of college students favoring Kerry, as opposed to the 46 percent of the general population at the time (Schneiders/ Della Volpe/ Schulman). Harvard's poll reports that students identifying themselves as Democrats outnumbered the number of students identifying themselves as Republican or Independent. This research examines the voting behavior of 500 University of Georgia students during November 2004 to determine how students at the University compare to other Georgia residents. Using a web based survey instrument, a random sample of University of Georgia respondents were asked a variety of questions related to their political attitudes. The survey directly deals with party affiliation and voting behavior. The web survey results will be compared to responses of a random sample of 500 Georgia residents asked the same questions in a statewide RDD telephone survey conducted at the Survey Research Center in October before the election. Based on the fact that Georgia is considered a Republican stronghold, the research will examine whether Harvard's poll results apply to the state of Georgia, in order to further grasp the rather enigmatic young adult vote. Using a sample of undergraduate students at the University of Georgia the results will either reject or corroborate the findings that

UGA students are more likely democratic and favorable towards John Kerry than the Georgia public at-large, ultimately obtaining more of an idea into the political mindsets of 18-24 year old voters.

Research Experience for Undergraduates [REU]: Encouraging Underrepresented Students to Careers in Science via the GA Herbarium Cultivated/Economic Plant Voucher Collection

Ashley Jackson, Shauncre Mitchell, and Nikkitress Nelson
Dr. Wendy B. Zomlefer, Department. of Plant Biology, University of Georgia

This research project was designed to develop a comprehensive species archive of cultivated and economic plants from the University of Georgia campus, the State Botanical Garden of Georgia, and the Horticultural Test Gardens. National Science Foundation REU [Research Experience for Undergraduates] was created to encourage the participation of underrepresented students, particularly African American women, in the field of organismal/plant biology through the University of Georgia Herbarium. The authors as interns collected 500 plant specimens, recorded field data, identified plants, prepared label data, and pressed and mounted these specimens for archival storage for research use in the University of Georgia Herbarium. This was done to restore and expand the herbarium teaching collection, increasing the holdings by 20 percent. The mounted specimens will also enhance teaching and learning environments by providing tangible prototypes for this type of study. This pilot program will provide a model for a more permanent intern training program in the future.

A Selected Ion Flow Tube Study of the Reactions of a Sequence of Ions with Amines

Douglas M. Jackson, Nathan J. Stibrich, Dr. Nigel G. Adams, Lucia M. Babcock,
Department of Chemistry, University of Georgia

In seeking a viable pathway from interstellar species to more complex organics such as the amino acids glycine and alanine, it is possible that through a joining of amine and carboxyl functional groups, a product of interest may be obtained. As a prelude to such a study, the ion-molecule reactions of the simple ions N^+, N_2^+, Ar^+, CO_2^+, CO^+, and O_2^+ as well as the protonated species, $HCOOH_2^+$, $CH_3COOH_2^+$, and $HC(OH)OCH_3^+$, with reactant gases CH_3NH_2 and $CH_3CH_2NH_2$ have been investigated in a Selected Ion Flow Tube (SIFT) at 298 K. The neutral amines fragmented to some degree in all cases when reacted with ion species containing no acidic protons, fragmenting more with increasing recombination energy of the primary ion; whereas, the amines readily accept a proton from the protonated acids and methyl formate ions. The rate coefficients of these reactions have also been determined showing that they are nearly all gas kinetic with the ethylamine reaction rate coefficients tending to be slightly less than their methylamine counterparts.

The Management of Predation Among Young, Middle Class Drug Dealers

Scott Jacques
Dr. Mark Cooney, Department of Sociology, University of Georgia

This study addresses the issue of predation and its management in the social world of young, middle class dealers. Data are drawn from in-depth interviews with 11 former and current drug dealers from the suburban area of a major southeastern city of the United States. In contrast to the inner city drug dealers described by previous researchers, predation and violence play a comparatively minor role in these dealers' careers. Predation varies across dealers, however, and factors that increase an individual's likelihood of being preyed upon are discussed. Importantly, most acts of predation are not violently avenged but results in attempts to negotiate a solution or are simply tolerated. Thus, the paper shows that high rates of violence are not intrinsic to illegal drug markets.

Gene Expression in Human Embryonic Stem Cells

Natalie Jennings, Annie Tran, Ezinne Okwandu
Dr. Lee Pratt, Department of Plant Biology, University of Georgia

Embryonic stem cell research is a rapidly growing field that provides a promising future for regenerative medicine. Because embryonic stem cells are unspecialized cells in the human body that have the ability to differentiate into all other cell types, they have attracted scientific attention for use in treatment of cellular diseases through imposed differentiation. The purpose of this study is to identify genes expressed in human embryonic neuro-progenitor stem cells to gain an understanding of stem cell function and perhaps to discover new genes. Complementary DNA (cDNA) was made through reverse transcription of messenger RNA (mRNA) from human embryonic stem cells. This cDNA was ligated into a plasmid vector, which inter was electroporated into *Escherichia coli*, where it replicated with the bacterial chromosome. Plasmid vectors were isolated, thermal cycled, and their DNA inserts sequenced in both 3' and 5' directions. The 2,304 sequences produced were deposited in GenBank, adding to the collection of all DNA sequences available for comparison. With BLAST each sequence was compared, to all other DNA sequences to determine any similarities with known genes and to possibly identify novel genes. These data will help the scientific community learn more about the genes expressed in embryonic stem cells and might provide insight into what gives embryonic stem cells their abilities to differentiate into all other cell types. Our contributions to understanding the transcriptome of embryonic stem cells will assist in future use of stem cells in treating cellular degenerative diseases.

Bilingual Healthcare: Challenges posed and how they are met

Ashley Johnson
Dr. John Ross, Department of Romance Languages, University of Georgia

One of the most significant challenges facing healthcare providers today is the need to provide services in multiple languages to a growing community for whom meaningful access to healthcare remains sadly lacking. Supreme Court interpretation of Title VI of the Civil Rights Act of 1964 legally places the burden of overcoming language barriers on healthcare providers rather than on patients.

Healthcare providers have sought to fulfill this need in numerous ways that vary in cost and effectiveness. It is also important to note that there are technical and ethical considerations that must be addressed whenever people must communicate through an interpreter. All parties must keep in mind that interpretation is performed not only across languages, but across cultures as well, requiring that those communicating through an interpreter have some understanding of the unique demands of the situation.

While the need for bilingual healthcare is a national issue, it is one that strongly affects individuals at the community level. Thus, for this study, emphasis has been placed on resources that are available specifically to Athens residents. Interviews with healthcare providers and direct observations of healthcare settings have yielded an understanding of how the challenges of providing bilingual healthcare are being overcome on a local level, and will hopefully raise awareness of an important community issue.

***Vibrio fischeri ArcA*- Mutant Sheds New Light on Bioluminescence Regulation**

Ashley M. Johnson, Jeffrey L. Bose, and Dr. Eric V. Stabb, Department of Microbiology, University of Georgia

The Hawaiian bobtail squid, *Euprymna scolopes*, and its bioluminescent bacterial symbiont, *Vibrio fischeri*, provide a useful model for studying symbiotic relationships. Although bioluminescence is necessary for squid colonization by *V. fischeri*, it is a metabolically expensive process that actually causes a competitive defect *in vitro*. Describing the regulation of bioluminescence may lead to an understanding of its selective advantage for *V. fischeri*. Previous hypotheses that bioluminescence may aid *V. fischeri* in

maintaining redox balance by reducing excess reductant led us to investigate ArcAB, which forms a redox-dependent two-component regulatory system and may regulate the light-generating and oxygen-reducing lux genes. To begin testing this, we generated a *Vibrio fischeri arcA-* mutant (AMJ2), which we found was ~1000-fold brighter than wild-type. *ArcA* is a key metabolic regulator, and enhanced bioluminescence in its absence could result from either increased substrate availability or direct transcriptional regulation of the lux promoter. Two lines of evidence support the latter model. First, mutation of *arcA* did not enhance luminescence when the native *luxI* promoter-gfp reporter was replaced by the Ptac promoter. Second, a *luxI* promoter-*gfp* yielded 16-fold higher fluorescence in AMJ2 than in wild type. We also found that adding the reductant DTT, which activates *ArcA* in *Escherichia coli*, decreased luminescence in wild type but not AMJ2, indicating that *ArcA* responds to reducing conditions by repressing *lux*. Finally, AMJ2 produced the same amount of light in culture as both it and wild type produced in the light organ of *E. scolopes*, suggesting that *ArcA* transcriptionally represses luminescence of *V. fischeri* in culture, but that the *ArcA* regulon is derepressed during colonization of its mutualistic host. Contrary to our original hypothesis, bioluminescence does not act to consume excess reductant, evidenced by the fact that in the presence of excess reductant *ArcA* represses the *lux* genes.

The Journal for Undergraduate Research Opportunities: Building an Undergraduate E-journal for Research in the Arts and the Humanities

Jeremy Johnson
Dr. Pamela Kleiber, Center for Undergraduate Research Opportunities, University of Georgia

Undergraduate research plays a significant role in science but has been traditionally less well represented in the arts and humanities. To promote undergraduate research in the arts and humanities, the University of Georgia's Center for Undergraduate Research Opportunities established the Journal for Undergraduate Research Opportunities (JURO@GA). This e-journal was specifically designed to encourage undergraduate scholarship through online publishing opportunities in the arts and humanities. Since its inaugural issue the editorial staff of undergraduates has grown from three to nine and has experimented with many unique online formats seeking to challenge the boundaries of a traditional research journal while generating a valuable space for scholarship. The documented experience of the staff will assist others in establishing and managing e-journals in the arts and humanities and create dialogue on the use of the internet as an intellectual space for future undergraduate research in all fields.

Shahidki: The Black Widows of Chechnya

Jeremy Johnson
Dr. Amy Ross, Department of Geography, University of Georgia
Dr. Eve Troutt-Powell, Department of History, University of Georgia

The global phenomenon of suicide bombing has significantly marked modern memory. From Sri Lanka to Palestine to Columbia, suicide violence has profoundly shaped the nature of global conflicts. Suicide bombing has recently become a part of the current Chechen conflict. In Chechnya, the majority of suicide bombers are women. Despite intense reaction and condemnation of suicide bombers, female suicide bombers from Chechnya remain particularly unexplained in the eyes of Russians and the international community; few scholars are currently studying them. The individual motivations for suicide bombing in Chechnya are complexly entangled in the struggle of not only the Chechen people in their conflict with Russia, but also the struggle of women in Chechen and Russian societies. Chechen female suicide bombers come from one of the most war torn locations on the globe. Many are victims of rape and torture. Some have lost family members in the wars (thus leading to their commonly accepted title “black widows”) and others have been rejected by their families. This paper explores women’s history as part of the Chechen conflict particularly as suicide bombers while analyzing links between female identity formation in Chechnya and human rights abuses

in order to shed light upon the making of suicide bombers in Chechnya. Using the resources of EastView and the Columbia University libraries, this paper analyzes current English and Russian scholarship as well as Russian media sources including interviews with a failed suicide bomber (Zarema Muzhakhoyeva) and witnesses of recent suicide bombing hostage crises (Nord Ost' and Beslan).

Using PCR to Confirm the Serogroup and Serotype of *Salmonella* Samples

Elizabeth Kantor and Erika Lentini
Dr. Susan Sanchez, Athens Diagnostic Laboratory, University of Georgia

Each year, millions of people and animals are infected by the dangerous pathogen *Salmonella*. The pathogen can be categorized into serogroup, which are then subdivided into serotypes. The identification is pertinent in treating the disease, as the virulence of the infection often depends on the specific bacterial species causing the infection. Serogroup is based on the presence of specific O-antigens, polysaccharides which form part of the outer bacterial membrane. Serotypes are determined by the structure of both cellular (O) and flagellar (H) antigens. The purpose of the project was to validate serogrouping and serotyping PCR primers using isolates obtained from cattle. A total of 168 samples were tested. By both PCR and agglutination, each sample was tested for the following common serogroups: B, C1, C2, D1, and E1. Of the 168 samples tested for these serogroups, 145 were conclusively serogrouped by both PCR and agglutination. Then specific PCR primers and restriction length polymorphism combinations were used to detect 5 of the most common serotypes: Typhimurium, Heidelberg, Hadar, Enteritidis and Newport. Thirty-four percent of the isolates were group B, with 35% of them being Typhimurium and 2% Heidelberg. Sixty-three percent were group C2, but not serotype Newport or Hadar. Another 3% of the samples tested were determined to be of the E1 serogroup. One hundred and forty-five of the 168 isolates tested, or 86%, were able to be serogrouped, as confirmed by both PCR and agglutination. Of the remaining 23 isolates that have not been serogrouped, 13 did not agglutinate with antiserum corresponding to all of the serogroups tested, nor did these 13 samples test positive for these serogroups via PCR. This means that PCR and agglutination only yielded inconsistent results in 10 isolates, or 6% of the total samples tested. It should also be noted that of these discrepancies, 50% tested positive for B via agglutination and negative for B via PCR, while the other 50% tested positive for the E1 serogroup via PCR and not by agglutination. The fact that these discrepancies are spread evenly indicates that both PCR and agglutination are equally effective in determining serogroup. Because only 5 common serotypes were tested, fewer isolates were able to be conclusively serotyped, accounting for the low percentages of isolates serotyped within each serogroup. New probes need to be designed to be able to detect more serotypes. However, PCR proves to be an effective procedure for serogrouping and serotyping *Salmonella* from cattle, but more probes need to be designed to allow the detection of more serotypes.

U.S. Foreign Policy towards Central Asia

Akrom Khaydarov
Dr. Gary Bertsch, Center for International Trade and Security, University of Georgia

The foreign policy of the U.S. towards the five new independent states in Central Asia – Kazakhstan, Uzbekistan, Tajikistan, Turkmenistan and Kyrgyzstan--emerged after the collapse of the Soviet Union in 1991. The U.S. has two main strategic interests in the Central Asian region. The first one is the geopolitical location of the region, which is a bridge between Europe, South Asia, the Far and Middle East. The second one is the geo-economical interests of the U.S. in the natural resources of the region.

Special attention is paid to the bilateral relations of the U.S. towards two leading countries of the region – Kazakhstan and Uzbekistan. U.S.-Kazakhstan relations reflect the cooperation of two states in security and economic spheres and the establishment of the "Energy Partnership." The U.S.-Uzbekistan relations shows the

development of the bilateral cooperation which rapidly changed after the 9.11 events and the U.S. military operation in Afghanistan. This activisation of relations led to the signing of the "Declaration on the Strategic Partnership and Cooperation" in March 2002, and expansion of the range of cooperation.

The research here utilizes primary sources from the Central Asian states and the United States. It involves interviews with officials and experts directly involved in the issue area. The analysis of U.S. foreign policy towards the Central Asian states determines that the U.S. foreign interests are divided in to three major fields of cooperation, embracing political and economical reforms and human rights issues in each country. American presence in the region is a factor of the stability and encouragement of the Central Asian states to achieve their goals.

"Comprehensive Responsibility" and Economic Growth

Gene Kim
Dr. Santanu Chatterjee, Department of Economics, University of Georgia

In recent years, corruption and governance issues have risen to the forefront of development economics, leading to several anti-corruption programs at national and international levels. As an interdisciplinary concern of legal, political, and ethical dimensions, corruption raises fundamental questions about the role of capital and the future of civil society, as well as the continuing role of traditional capital and trade networks in the lives of individuals. This paper will examine the relationships between environmental ethics, social responsibility, and corporate governance on investment and economic growth.

There are several prominent environmental, social responsibility, and corporate governance disputes between multinational corporations and local communities, and national governments in the world today. The fair appropriation of risks and profits is at the core of these disputes. Country-specific indices of environmental sustainability, political rights and civil liberties, and corporate governance will serve as proxies to an exhaustive survey of all possible court cases, regulatory agency investigations, and international sanctions. These indices will be tested for joint statistical significance, and potentially reveal relationships between environmental, social, and corporate policy as determinants of national economic growth and investment.

Attributional Style, Spirituality, and Religious Problem-Solving: Implications for Psychological Well-Being in African American College Students

Brittany King
Dr. Rosemary E. Phelps and Tonette Robinson
Department of Counseling and Human Development Services, The University of Georgia

Building upon the work of Callender (2003), the purpose of the current research project is to examine the influence of attributional style, religious problem-solving, and spirituality on psychological well-being in African American undergraduate and graduate students. Attributional style determines which forces individuals hold responsible for their successes and failures, while spirituality generally refers to a belief in a spiritual being or Higher Power. Religious problem-solving has been conceptualized in terms of three styles: self-directing, deferring, and collaborative. In this study, 75 African American undergraduate and graduate students who regularly attend church in Atlanta and Athens will complete a demographic questionnaire, along with the Extended Attributional Style Questionnaire, the Religious Problem-Solving Scales-Long Form, the Beck Depression Inventory-II, the Beck Hopelessness Scale, the Index of Race-Related Stress-Brief Version, and the Spiritual Well-Being Scale. After analyzing the data using regression equations, we hope to determine whether attributional style, religious problem-solving, and spirituality predict depression, hopelessness, and race-related stress in these students.

Quinic Acid Cluster Computational Model Analysis of RNA and Protein Intensities

Allison Koch
Dr. Jonathan Arnold, Department of Genetics, University of Georgia

The quinic acid cluster is a genetic network that is found in *Neurospora crassa*, which is a major model genetic system. This network quinic acid gene cluster and its products have been a major model for how genes are regulated. One way to speed up the process of our research would be to create a computer model that could predict the different levels of RNAs and proteins as the organisms are grown on quinic acid. The purpose of my project is to obtain experimental results that can be used to refine the regulation of the cluster model and verify the accuracy of its predictions. Applications of this kind of approach include metabolic engineering of useful biologicals, such as antibiotics.

The quinic acid cluster is a circuit used to help the organism utilize a carbon source, quinic acid. In this experiment, *Neurospora* is originally grown on medium containing sucrose. In the quinic acid cluster, sucrose acts as a preferred source of carbon. After the *Neurospora* developed, the organisms were transferred to grow on quinic acid-containing medium. Samples were collected at different time points and Northern Blot analyses were performed. They were probed with different genes in the cluster to determine their RNA intensities. Most of these measurements were previously taken by people in the lab. In my project, the RNA intensities of the *qa-1S* gene, a repressor for the whole cluster, were calculated. These measurements are being compared with the predictions of the computational model. In this way, the validity of the proposed model can be tested.

Another aspect of the computer model of the quinic acid cluster that could be integrated is protein analysis. For this part of the project, Western Blot analyses will be run on the different protein levels of the quinic acid gene products in the same shift experiment as before, beginning with the *qa-2* gene product. Hopefully, this will increase what is known of the protein intensities so that the model can be refined to predict them as well. In the end, an alternative hypothesis for explaining how a major genetic model is regulated will have been validated or developed.

Multiple Mates Enhance Offspring Viability for Female *Drosophila pseudoobscura*

Jessica Laverentz
Dr. Yong-Kyu Kim, Dr. Wyatt W. Anderson, & Dr. Patricia A. Gowaty, Department of Genetics, University of Georgia

Given the high costs of mating for female *Drosophila* and a morphology that allows sperm storage, the prevalence of multiple mating among females needs further investigation. Females who mate multiply rather than singly may offset survival costs with gains in reproductive output. *Drosophila* females who copulate repeatedly with the same male have a higher offspring production rate than females who copulate once, but benefits of multiple mates for females have not been found. We predicted that multiple mates for females would increase the proportion of emerging adult offspring to eggs laid, because greater variability in a female's offspring increases the probability that greater numbers will survive in variable environments. To test this hypothesis, we randomly assigned female *Drosophila pseudoobscura* to three treatments: 1) one copulation, 2) many copulations to one male, and 3) multiple mates. For all treatments, we counted the number of days each female lived, the number of eggs she laid each day until death, and the number of eclosed adult offspring she produced. Here, we show that across female lifetime, females who copulate with several males have significantly higher offspring viability than females who copulate with only one male, whether once or many times.

Hungary's PR Efforts in the Period of EU Accession: A Contemporary Case Study in International Public Diplomacy

Ivy Le
Dr. Ruth Ann Lariscy, Department of Public Relations and Advertising, University of Georgia

This study examines the role of public relations (PR) in one instance of globalization: Hungary's accession to the European Union (EU). Hungary joined the EU May 2004, little over a decade since its transition from communism to capitalism. The EU has never been an easy sell to the member nations — enlargement even less so. In Europe where many countries, including Hungary, have a tradition of national referendum on foreign policy decisions, popular support can legitimize or kill an international relationship. The Hungarian government's PR campaign to support its diplomatic efforts in joining the EU was domestic as well as Europe-wide in scope. The objectives were to educate about EU expansion and candidate countries (knowledge objective), to inoculate prejudices (attitude objective), and to motivate citizens to vote or, at the very least, to stop protesting (behavior objectives). Public diplomacy, PR directed at influencing a country's foreign policy, has become a notable tool for less powerful countries to participate in decisions that before were left to a few big players. This qualitative study analyzes press kits from the campaign, opinion polls commissioned by the EU, and interviews with some of the campaign's key players to investigate the power of conventional PR tools in bridging decades of political distance by shaping public opinion. This collection of information, a snapshot of the challenges of public diplomacy, facilitates future examination and interpretation.

Effects of Environmental Contaminant Perchlorate on Rat Thyroid Sodium-Iodide Symporter (NIS) mRNA Expression

Anna Lee, Irene Aninye, Matthew Taylor, Jeffrey W. Fisher, and Dr. Duncan C. Ferguson, Department of Physiology & Pharmacology, College of Veterinary Medicine, University of Georgia

The Na+/I+ symporter (NIS) is a glycoprotein that transports iodide into thyroid cells as an integral step for producing thyroid hormones, essential regulators of the basal metabolic rates of vertebrates. Ammonium perchlorate, a rocket propellant, has now become an environmental contaminant in water supplies in the southwest U.S. Perchlorate is a potent inhibitor of the functional activity of NIS, resulting in a relative iodine deficiency for hormone synthesis. We hypothesized that reduced serum thyroid hormone concentrations would result in increased thyrotropin (TSH) secretion by the pituitary gland, which is known to stimulate thyroidal NIS mRNA. In this study, 5 rats were exposed to 10 mg/kg/day of perchlorate in the drinking water for 21 days. Expression of thyroidal NIS was studied using mRNA extracted from the 5 control or 5 perchlorate-treated rats. The mRNA was reverse transcribed to produce cDNA, which served as a template for PCR with NIS-specific primers. Both semi-quantitative agarose gels and quantitative real time PCR were employed. Perchlorate treatment was shown to lead to a 3-fold increase in NIS mRNA expression, which approached statistical significance: NIS/18s mRNA ratio (mean ± SD(n)): control 3.2 ± 0.8(5), perchlorate 9.9 ± 3.0(5); $p=0.09$. In order to refine physiologically based pharmacokinetic models of perchlorate's thyroid toxic effects, continuation of this research will include *in vitro* studies to correlate mRNA expression to iodide uptake after the addition of various concentrations of bovine TSH in the Fisher rat thyroid cell line (FRTL-5).

A Study of the Physical and Biological Barriers to West Nile Virus Dissemination in Mosquitoes and Black Flies

Hayes Lee
Dr. Danny Mead, Wildlife Disease Study, University of Georgia

WNV was first discovered in North America in New York in the year 1999 and has since spread throughout North America. WNV is an arthropod-borne virus (arbovirus) that is maintained in nature through biological transmission between susceptible vertebrate hosts by blood-feeding arthropods. Although *Ornithophilic culex* species are considered to be the primary amplifying vectors, other insects are thought to be involved in transmission. Here, our objective was to investigate the WNV infection dynamics in mosquitoes and black flies, specifically in *Aedes aegypti*, A. *albopictus*, and *Simulium vittatum*. Insects were fed WNV spiked dog blood and groups of six insects were collected every three days for 21 days and fixed in 10% formalin. Samples have been paraffin embedded, cut to slides, and the route of virus dissemination throughout the 21 day period for each insect species are being analyzed by immunohistochemistry (IHC). A West Nile virus specific antibody is added to each slide and the virus' path through each insect body is tracked using special staining. Additionally, we are determining rate of virus replication throughout the time period using virus titration. In this study, we are determining the relative importance of specific tissues and organs for virus replication; and identifying the potential physical and biological barriers to WNV dissemination in each species.

Stochastic Simulations of Coevolution and Population Dynamics in Host-Pathogen Systems

Andrew Leidner, Matt Bonds, and Dr. Pejman Rohani, Institute of Ecology, University of Georgia

A central question in evolutionary ecology concerns the mutual selection pressure exerted by pathogens on social organisms. To address this issue, a mathematical model has recently been developed in the Rohani lab, which can be studied analytically to explore whether host-pathogen systems converge on a co-evolutionary equilibrium. The model diverges from other leading theories by demonstrating that increasing host sociality leads to decreased disease virulence and that disease prevalence can select for higher host sociality. My research tests the hardiness of these analytical predictions by building simulations with individual-object design, temporal dimensions and stochastically chosen events. The guiding question is: do hundreds of independently behaving organisms arrive at the deterministically-predicted co-evolutionary end point?

The results of the simulations suggest that the rate of mutation for both host and pathogen may prove a significant factor on a system's convergence to an equilibrium. To further test the model's rigor, this research compares the co-evolutionary outcome when host and pathogen mutation rates are relatively faster, slower or the same speed as the other.

The All-American Icon: Frank O'Hara and Coca-Cola Advertising in 1950's America

Megan Leroy
Dr. Susan Rosenbaum, Department of English, University of Georgia

The decade of 1950 in America was marked by new icons of Americanness and family values that were reflected not only in advertisements but in literary works. My research focuses on three poems by New York School poet Frank O'Hara—"Having a Coke With You," "A Step Away From Them," and "Song"—that engage Coca-Cola as a cultural icon. My research also focuses on the history of Coca-Cola's advertising as an evolving symbol of consumer culture in 1950's America. O'Hara was an avant-garde poet, one of the first to embrace pop culture icons such as Coke and to consider the connections between poetry and consumer culture, poetry and advertising. Both O'Hara and Coca-Cola claimed new audiences such as homosexuals (O'Hara) and women (Coca-Cola). Questions my project will consider include: How do O'Hara's view of Coke and actual Coca-Cola advertising ploys coincide? How did 1950's consumer culture shape the porous

boundary between advertising and art well before the dominance of pop art? By explaining O'Hara's poems in the context of the history of Coca-Cola advertising, I will show how he adapted this American icon to comment on an increasingly mobile, technological, and status-seeking society. However, hesitant to outright embrace consumerism and the complete American dream, O'Hara subversively altered the icon of Coke to create an image including more than the conventional, happy American family. O'Hara and his connections with Coca-Cola evolved not only as a product of Cold War America, but as a dynamic force acting within it.

Public Education and the Power Elite: Systematic Abandonment and Widespread Under-Funding

Brian Levy
Dr. Linda Grant, Department of Sociology, University of Georgia

Recent debates regarding Georgia's education system have tended to focus on the equality of school funding. Under the current procedures, each school district is expected, though not mandated, to pay a fair share to its school system, based on local taxes and property values. Because state funds are relatively controlled by the "local fair share" system and federal monies are minimal, local resources are likely the cause of any funding inadequacies that exist within Georgia's public schools. Utilizing school funding data from the Georgia Department of Education (DOE), this study will explore the nature of possible under-funding within Georgia—with geographic concentration of funding deficiency as its primary focus. As well, this study will search for a demographic correlation, comparing school enrollment data from the DOE to census data, to any under-funding that is found. Finally, if the current funding system proves to be geographically or demographically biased, possible alternatives, employing other states as case studies, will be explored.

Using Streptolysin O for Cell Permeabilization to Determine G-Protein Activation

Robin Nicole Ligler
Dr. David Puett, Department of Biochemistry and Molecular Biology, University of Georgia

Streptolysin O (SLO), a toxin produced by *Streptococcus pyogenes*, creates pores in the plasma membranes of cells. These pores may be used to transport proteins and other molecules into the cell to observe cellular dynamics in a controlled environment. This experimentation attempted to establish a general protocol for permeabilization with SLO in eukaryotic cells that may be used to investigate the activation of G-proteins by G-protein coupled receptors (GPCRs). G-proteins are a class of proteins that serve as mediators between the ligand-bound form of GPCRs and an effector enzyme; there are many types of G-proteins, and a receptor, such as the human luteinizing hormone receptor, activates one or more types of these G-proteins. Many aspects of the SLO permeabilization conditions were evaluated, such as the cell concentration, the buffer, the concentration of toxin, and the storage of the toxin. With the optimization of this technique, it is possible to investigate the natural GPCR and G-protein interactions in the cell. One method of exploring these interactions is a trypsin sensitivity assay. Inactive GDP-bound G-proteins have a different conformation than active GTP-bound G-proteins, and trypsin recognizes this difference. This method of determining G-protein activation detects the activation at the receptor/G-protein interface, which is a more accurate place to determine activation in comparison to other methods. By using SLO-permeabilized cells, it is possible to retain an in vivo environment capable of supporting the investigation of GPCR and G-protein activation using the trypsin sensitivity assay.

Foreign Policy Attitudes of the Young: A Comparison of 18-24 Year Olds in Georgia and University of Georgia Students

Chen Lin
Dr. James Bason, Survey Research Center, University of Georgia

Two of the most important issues over the course of the 2004 election were youth participation in voting and foreign policy issues, with heavy focus on the War in Iraq. By linking these two important issues together, there can be an assessment of differences in attitudes of University of Georgia students as compared to youth age 18 -24 statewide in Georgia. The study will test the hypothesis that support for the war in Iraq will be higher among youth statewide than among University of Georgia students. Youth attending college are presumed to have more liberal attitudes than their counterparts statewide due to the influence of education on political ideology. Thus, University of Georgia students should exhibit less support for the war in Iraq than youth statewide. Data for the study come from two sources, a statewide RDD (Random Digit Dial) probability sample of 500 Georgians statewide, and a list-assisted random sample of 400 University of Georgia students who responded to web based survey. Sampling error for each sample is no greater than +/- 5.0% at the 95 percent confidence interval. Results of the study found significant differences on certain issues between University of Georgia students and youth statewide. However, contrary to expectations, University of Georgia students were not more liberal than youth statewide regarding attitudes towards the war in Iraq. In fact, attitudes between the University students and youth statewide were very close on the foreign policy items. However, political ideology, as measured by party affiliation, displayed a strong relationship with attitudes towards the war, regardless of educational status. Understanding current attitudes of youth may provide a better understanding of likely political ideology when these youth become the decision-makers of tomorrow.

Partita in Eb (PADK IV:20): A Modern Performance Edition

Janel K. Long
Dr. Jean Martin-Williams, School of Music, University of Georgia

Franz Krommer (1759-1831) is best known for chamber music. He wrote many pieces of Harmoniemusik (music for wind instruments), including numerous Partitas for winds. Many of these Partitas remain unpublished, surviving only in manuscript form.

The research process required a dual approach: the theoretical and historical aspects of the period, and the performance practice of the period.

Copies of three unpublished Partitas were obtained and the Partita in Eb (Padk IV:20) was selected to be prepared in a modern performance edition. Editorial decisions regarding discrepancy in notations within individual parts, between parts, and among modern and historical practices were made.

To better understand Krommer's compositions, the instruments for which he composed must be understood. Thus, the classical natural horn (a horn without valves) was selected for study due to this researcher's previous nine years of study of the modern valve horn. The researcher studied the general technique and performance practice of the instrument with Professor Richard Seraphinoff, Indiana University, one of the world's leading practitioners of natural horn.

The researcher presented a recital of natural horn music including the edition of the Partita on November 17, 2004.

History Defeated: The Art of Kara Walker

Lauren MacDonald
Prof. Isabelle Wallace, Department of Art History, University of Georgia

Within the first ten years of her career, contemporary American artist Kara Walker has already received considerable acclaim for her work, most notably as the youngest-ever recipient of a Macarthur "genius" grant in 1997.

Her cut paper installations revive the archaic, recreational craft of the silhouette, harnessing its graphic power and genteel connotations to deconstruct essential ideas about race and gender. Simultaneously she revives (or perhaps more appropriately, revisits) volatile black stereotypes, manipulating the icons and the pain, discomfort, and embarrassment they illicit in tandem. Her utilization of such abrasive imagery has sparked a heated racial dialogue in the art world; the controversy surrounding Walker's work is a strong indicator of both her impact in contemporary art and the power such "archaic" stereotypes still possess. Her work revels in the racially distasteful and taboo, articulating the very reasons such categories exist in America's collective visual memory; this "memory" is the decided source of Walker's artistic voice.

My paper will explore Walker's appropriation of historicized archetypes— especially those dealing exclusively with the South, derived from Gone With the Wind-style Antebellum romanticism and racial conventions of the 19th century—considering how history's fragility and subjectivity serves as the foundation of her work. In doing so, I will draw parallels between the constructed visual histories of her tableaux and those of the South's historical landmarks, particularly one of Walker's admitted inspirations: the Atlanta Cyclorama. Further I will explore how, in the introduction of such an egregiously invented narrative, Walker strives to emphasize what is problematic about the scope of American history as imagined by a dominant, white culture; the result is a history repressed, revised, or excised entirely. Indeed, in her work, medium and content are inextricably linked: rendered in "black and white," Walker's figures suggest a plain, unmediated truth, yet they are essentially reflections of the distortion white vision has historically imposed upon black identity.

Shakespeare's Words in Moving Images
Josh Marsh
Dr. Fran Teague, Department of English, University of Georgia

How best to imagine Shakespeare's words in moving images? Our culture values film and Shakespeare, though in very different ways. The general public tends to favor film – the more accessible – and deny the bard the subculture of praise attached to cinema. When these entities collide, the opportunity arises for overlapping genres and transcending classifications. The romantic comedy Shakespeare in Love wittily puts the dramatist into the world of show business. I want to put Shakespeare into the world of human culture. Specifically, Dr. Teague's Shakespeare and Film class provided the impetus for an ongoing experiment to combine the depth of a Shakespearean drama with cinema: our society's flagship for the culture of "cool." After viewing and critically assessing a variety of major motion pictures adapted from the works of Shakespeare, I endeavored to reproduce a modern version of The Merchant of Venice, a play whose content often results in controversy. Instead of focusing on the anti-Semitic attitude inherent in many of the play's characters, I concentrated on the relationships between the characters who ultimately survive the comedy with seemingly no sacrifice. This critical approach allowed the adaptation to better represent a variety of less-acknowledged events within the play. For the symposium, I will investigate this topic, and illustrate my points with examples from an original production.

The Effect of Mutations on the Substrate Specificity of RCE1
Jay McCracken
Dr. Walter K. Schmidt, Department of Biochemistry and Molecular Biology, University of Georgia

Our purpose was to determine how different mutations in the amino acid sequence of posttranslationally modified proteins affected the substrate specificity of the RCE1 protease. Our hypothesis is that the two CAAX motifs CVIA and CTLM would be cleaved by Rce1p and that the CASQ motif would be cleaved by Ste24p. In the a-factor pathway, two different types of cells are needed to combine to form a diploid cell, a cells and α cells, which once inhibited can stop tumor growth caused by this pathway. In our experiment, twenty two mutants were created based on single point

mutations of amino acids of the protein sequence. These mutations were chosen because they were either highly conserved in many orthologs of rce1 proteases or highly variable and necessary for action. The experiment was transformed in a background strain of *Saccharomyces cerevisiae* which lacked both the mating factor and rce1 genes necessary for mating. The strain was transformed with RCE1 containing twenty-two different mutations producing twenty-two different strains of yeasts. These mutants were then transformed with the three different CAAX motifs (mating factor gene), CVIA, CASQ, and CTLM. This resulted in sixty-six different mutants where each of the twenty-two mutants now contained the three different mating factor motifs. Since CASQ is only cleaved by Ste24p, and our mutants lacked that gene, it was expected that none of the mutants with ste24 showed growth in the mating tests. The other two motifs, CVIA and CTLM which are cleaved by Rce1p, showed growth as predicted.

Conspecific Sperm Precedence in *Drosophila pseudoobscura*

Jon McGough
Dr. Yong-Kyu Kim and Dr. Wyatt Anderson,
Department of Genetics, University of Georgia

Drosophila females mate with more than one male in nature. Conspecific matings (matings with the same species) are usually successful in producing viable offspring. However, when matings between different species occur (heterospecific matings), offspring are often inviable or sterile. We expect natural selection to act against the formation of hybrids, which are reproductively wasteful. Utilizing 1) two strains of *Drosophila pseudoobscura*, Mainbody and Bogotá, which are in the process of diverging, and 2) sibling species, *D. pseudoobscura* and *D. persimilis*, which diverged 500,000 years ago, we tested the hypothesis that conspecific gamete precedence (CGP) reduces the cost of heterospecific mating and is favored in nature. In this experiment, we compared 1) the amount of sperm transferred per mating and 2) the number of progeny of each female after mating with both conspecific and heterospecific males. To measure sperm transfer, sperm was collected from recently mated females and stained with a DAPI solution on glass slides. The slides were then analyzed under a fluorescent microscope using NIH image software to measure the number of sperm transferred. To count the progeny, female virgin flies were first mated with a conspecific male for 48 hours and were then mated with a heterospecific male for an additional 48 hours, or vice versa. After mating, each female fly was transferred to different vials for 15 days, and adult offspring were later counted using mutant markers. Current data show that conspecific matings delivered more sperm, although statistically insignificant; and that Mainbody and Bogotá females produced more offspring with Mainbody males, regardless of the order of mating. These results may suggest 1) CGP did not yet occur between the diverging Mainbody and Bogotá strains and 2) gametes of Mainbody males are more effective in fertilization than their Bogotá counterparts. Observations between *D. pseudoobscura and D. persimilis* are currently being processed.

Phenotypic Changes in Dendritic Cell and T lymphocyte Subpopulations of Mice Infected with *Schistosoma mansoni* or Exposed to *S. mansoni* Eggs

Jonathan McWhorter
Dr. Daniel Colley, Department of Microbiology and the Center for Tropical and Emerging Global Diseases, University of Georgia

Schistosomiasis is a parasitic worm infection of 200 million people. Schistosomes live in blood vessels and release eggs which can go to the liver and induce the immune-mediated granulomas responsible for disease pathology.

In a mouse model, two forms of infection can develop: hypersplenomegaly syndrome (HSS) and moderate splenomegaly syndrome (MSS), mimicking the human schistosomiasis clinical spectrum. We have shown upregulation of the PD-L2 surface marker on some splenic dendritic cells correlates with a mouse being MSS. PD-L2 is a co-regulatory ligand for a regulatory marker PD-1 on T lymphocytes, and leads to down regulation of T lymphocytes. Our studies were done to determine if schistosome eggs

induce PD-L2 and PD-1 expression on dendritic cells and T cells, respectively.

Treatment of S. mansoni infected mice with a drug that kills schistosomes prior to egg production, and infecting with single sex schistosomes, can produce"egg-less" infections. At 10 weeks 4.9% +/ 0.4% of B220- dendritic cells in infected mice expressed PD-L2 as opposed to16.2% +/- 1.3% in treated mice.
S. mansoni egg injections into uninfected mice ('egg only" exposure) augmented the % of these cells that express PD-L2 (14.1 +/- 3.9 vs. 3.1 +/- 0.5; egg injected vs uninjected). Therefore, we propose PD-L2 expression by these cells is induced by schistosome eggs. We will also present data on PD-1 expression on CD4+ T lymphocytes, and correlations between these markers and morbidity.

Functional Analysis of Yeast Axl1, Ste23, and IDE Mutants
Amulya Nagarur
Dr. Walter K. Schmidt, Department of Biochemistry and Molecular Biology, University of Georgia

The overarching aim of this research is to study two enzymes, Axl1p and Ste23p, of *Saccharomyces cerevisiae* (yeast), in order to gain more knowledge about a similar protein, insulin-degrading enzyme (IDE), which has shared homologies to both Axl1p and Ste23p. IDE is proposed to have a role in the prevention of Alzheimer's disease. Both Axl1p and Ste23p are proteases that are involved in the production of the yeast a-factor mating pheromone. The main focus of this research is to evaluate the effects of mutations on the function of Axl1p, Ste23p, and IDE via genetic tests. As a starting point for this study, a collection of Axl1p, Ste23p, and IDE mutants were characterized. Using Western Blot analyses, it was determined that the mutations do not alter protein expression. However, certain mutants were severely compromised in mating efficiency. It was determined that certain histidine and glutamate residues of an extended metalloprotease motif are essential for the activity of all three enzymes. Mutation of the first histidine residue in the motif shows a lack of mating activity in Axl1, Ste23, and IDE, as does site-specific mutagenesis at the first glutamate, second histidine, and third glutamate residues (HXCEHX69EX6EX57C…S). In conclusion, mating tests performed on axl1, ste23, and IDE mutants reveal that certain amino acid residues of the metalloprotease motif are essential for activity in the a-factor biogenesis pathway. Other residues are not critical; mutations at these residues do not compromise mating activity. As hypothesized, Axl1 and Ste23, homologues of IDE, are proteases, involved directly in the production of the a-factor signaling molecule. The next phase of this research involves making additional mutations via the recombinational transfer method, and evaluating their ability to promote a-factor production via genetic tests.

Detecting RSV Virus by Quartz Crystal Microbalance
Matthew Nicholson
Yiping Zhao, Department of Physics and Astronomy, University of Georgia

Respiratory syncytial virus (RSV) is highly contagious and causes an illness that resembles a moderate to severe cold. Immuno-compromised people, people with heart or lung problems, infants, and older adults have a risk of developing complications from RSV infection. Current PCR techniques can only detect up to a 10-6 dilution of RSV. A faster and more sensitive detection technique is needed. Here we developed a new detection technique using a quartz crystal microbalance that was made to specifically detect RSV virus. Using this technique we can achieve a detection limit of 10-10, which is 4 orders of magnitude higher than using PCR. Another benefit to the QCM technique over PCR is the fact that it can be used label free – the sample flowed over the crystal does not need to be modified or labeled in any way, thus making the QCM more physiologically relevant. Also, the QCM provides real-time data which is an advantage over the ELISA method which doesn't provide feedback until the entire process is completed.

Thiolated RSV antibody immobilized onto one of the gold electrodes of the piezoelectric quartz

crystal surface made it possible to specifically detect RSV. Different dilutions of RSV lysate were then pumped through a flow cell housing the quartz crystal. The frequency change was recorded and compared to the same dilutions of cell lysate which lacked the RSV proteins. We experienced a negative correlation in the change in frequency as the dilutions of RSV became more concentrated, and no correlation of frequency and concentration with the control cell lysate. Eventually the same technique could be used to detect various disease agents such as E. coli and salmonella.

A Novel Assay for Insulin Degrading Enzyme and it Yeast Orthologs

Tatyana Nienow
Dr. Walter K. Schmidt, Biochemistry and Molecular Biology, University of Georgia

Ste23p and Axl1p are recently-discovered metalloproteases found in the yeast *Saccharomyces cerevisiae*. They are involved in the maturation of the a-factor pheromone responsible for mating in yeast and are thought to cleave the a-factor precursor directly, although this has not yet been confirmed biochemically. Ste23p and Axl1p share significant sequential homology with insulin-degrading enzyme (IDE). Failure of IDE to cleave its primary substrate, insulin, has been implicated as a potential factor in Type 2 diabetes, while another substrate of IDE, β amyloid, forms the senile plaques found in Alzheimer's Disease if not cleaved and removed from the brain.

It is hoped that studying the function of Ste23p and Axl1p could lead to a better understanding of the functions of IDE, but currently there is little known about these orthologs, and there are few methods available with which to study their activity. Development of an assay would not only lead to a better understanding of the function of these particular proteases, but proteases of the M16 family as a whole. We attempted to design an *in vitro* assay for all three proteases, as there is no such assay yet available. The assay used a synthetic substrate derived from the yeast a-factor mating pheromone designed to fluoresce when cleaved by a protease. Unfortunately, the activity particulate fractions containing the proteases were too low for the assay to be of practical use, implying that they had little affinity for the substrate. Future attempts at developing an assay should involve altering either the method of purifying the proteases being tested, or using a different substrate in the experiment.

Fibroblast and Epithelial Cell Interactions in Tropical Pulmonary Eosinophilia

Kurinji Pandiyan
Dr. Julie Moore, Department of Animal and Dairy Science, University of Georgia

Tropical Pulmonary Eosinophlia (TPE) is a manifestation of the parasitic condition filariasis, which is characterized by the disfiguration and swelling of limbs. In the chronic state of TPE a condition of pulmonary fibrosis exists, wherein fibroblast cells, cells that produce connective tissue, proliferate extensively changing the lung morphology and decreasing lung capacity. This study was aimed at mimicking the condition of the lung during the pathological state of pulmonary fibrosis, by establishing a coculture between mouse fibroblast and lung epithelial cells, and determining the responses of the epithelial and fibroblast cell lines to the filarial parasitic sheath protein. The study also attempted to determine whether Matrix Metalloproteinases (zinc-ion-endopeptidases that cleave most components of the extra-cellular matrix and, hence, are linked to tumor metastasis and cancer) were produced by the cells in this condition and if so by which cells. On long exposure to the filarial parasitic sheath protein epithelial cells underwent cell death whereas fibroblast cells proliferated extensively, which correlates to the model of pulmonary fibrosis in the lung. Matrix Metalloproteinases 2 and 9 were detected at the RNA level by means of a Reverse Transcription – Polymerase Chain Reaction for mouse fibroblast cells. More cocultures are to be established between lung epithelial and fibroblast cells in order to see the effect of the two cell lines on each other for cell proliferation and production of Matrix Metalloproteinases.

Creation of a Novel Ribonuclease T1 Gene for Protein Folding Studies

Will Parker
Dr. Marly Eidsness, Department of Chemistry, University of Georgia

Protein folding is an important field of study due to its significance in disease profiles, such as Alzheimer's and Parkinson's diseases. Little is known about the actual process by which proteins fold *in vivo*, and experiments that attempt to solve the mysteries of protein folding are important in understanding the mechanisms of protein biosynthesis in the cell. In order to add to this body of knowledge, an experimental approach will be used to visualize proteins as they fold in a cell-free expression system using fluorescence spectroscopy. A two-fluorophore experiment utilizes a fluorophore incorporated into the nascent polypeptide chain being synthesized and a different fluorophore attached to trigger factor, a ribosome-bound protein positioned near the nascent chain tunnel exit. Experiments are designed to retain the nascent polypeptide chain on the ribosome after completion of its synthesis. To solve this problem, a modified ribonuclease T1 gene was created for use in cell-free expression systems that would, when translated, remain bound to the ribosome. The novel T1 gene was created using polymerase chain reaction strand overlap extension, PCR SOEing, with the gene ribonuclease T1 and neomycin phosotransferase II (NPT2). The importance of using ribonuclease T1 is its short length, well defined folded form, and sensitive assay, while the NPT2 gene is important in the predicted helical structure of its 50 amino acids. The NPT2 gene is attached at the C-terminal end of the T1 gene and is designed to end with two rare arginine codons that cause ribosomal pausing during synthesis, thus retaining the C-terminal end of the T1NPT2 polypeptide on the ribosome. The 50 amino acids of NPT2 allow the nascent polypeptide to remain bound to the ribosome, while still allowing the T1 portion of the expressed gene to extend out of the ribosomal tunnel far enough to allow to complete t folding. Proper folding is analyzed by ribonuclease T1 assays. This work describes cloning of the T1NPT2 construct and preliminary characterization of T1NPT2 in cell-free expression experiments.

Constitutively Active Lutropin Receptor Mutants Associated with Familial Male-Limited Precocious Puberty

Gehres Paschal, Krassimira Angelova
Dr. David Puett, Department of Biochemistry and Molecular Biology, University of Georgia

Naturally occurring familial and somatic mutations in the lutropin receptor (LHR) gene can result in either gain-of-function, i.e. constitutive activation, or loss of function, and can lead to severe, irreversible conditions. Familial or sporadic precocious puberty is a particular type of isosexual puberty that usually appears between the ages of 3 and 4 years. A patient with this disorder has adult levels of serum testosterone and exhibit prepubertal Leydig cell hyperplasia. The most common locus of this disorder is in position 578 of transmembrane helix six of the receptor. Several mutations at this position have been identified that result in constitutive LHR activation, leading to a stimulation of the Gs pathway with increased activity of the enzyme, adenylyl cyclase, which is responsible for converting ATP into cAMP, a secondary messenger in the cell. Somatic mutations of the LHR such as Asp578H is (D578H) have also been identified in the DNA of Leydig cell tumors and metastatic thyroid carcinomas. Similarly, another naturally occurring somatic mutation at position 578 of the LHR, the replacement of Asp with Tyr, D578Y, has been found in the isolated specimens of young boys with severe Leydig cell hyperplasia. The purpose of this project is to characterize the binding and signaling parameters of two constitutively active forms of LHR using a transfected HEK 293 cell culture system. Binding experiments using radioactive [125 I] hCG were conducted in order to measure receptor-hormone affinity, and radioimmunoassays were used to measure concentrations of cAMP after hCG simulation. Results of these experiments show that the wild type receptor has a slightly higher binding affinity for hCG, suggesting that both the histidine and tyrosine mutations in position 578

of the receptor may cause structural modifications in the binding domain. Mutations within a transmembrane helix of a G protein-coupled receptor may cause local alterations in the conformation near the mutated residue, allosteric changes elsewhere in the protein, as well as changes in interhelical packing of the receptor. The results of the signaling experiments clearly suggest that both mutant forms of LHR found in patients result in elevated basal levels of cAMP, signifying the constitutive activation of adenylyl cyclase in the absence of ligand. The second part of this study involves a proteomic analysis of the cell-receptor systems. Variant down-stream protein expression of both constitutively active mutant forms of the LHR are evaluated using the Ettan DIGE, a 2-D Gel system which quantitatively detects changes in cellular protein expression and identifies proteins being overexpressed through mass-spectrometry. This information will aid in delineation of how the activating mutations regulate the amounts of certain types of proteins in the cell and how abnormal protein expression could be involved in the onset of pathophysiologoical events.

Analysis of Bmp Signaling During Thymus Organogenesis Using Neural Crest Specific Knockout Mice.

Seema R. Patel, Julie Gordon and Dr. Nancy R. Manley, Department of Genetics, University of Georgia

The purpose of this work is to test the hypothesis that Bmp4 expression and signaling is required for proper initial organogenesis of the thymus and parathyroid glands. Furthermore, in determining the signaling pathway of Bmp4 we may also determine if it is linked to any medical illnesses related to the thymus. During embryonic development, the thymus and parathyroid gland arise from the third pharyngeal pouch, with the parathyroid developing on the anterior portion and the thymus on the posterior end of the pouch. The bilateral primordia arise from interactions between the third pharyngeal pouch endoderm and surrounding neural crest cells. Bmp4 is a molecular signal found in the third pharyngeal pouch endoderm and surrounding neural crest cells. We have determined that Bmp4 is expressed solely in the thymus domain of the shared primordium, and this data suggests that it plays a role in early stage development of the thymus and parathyroid. Bmp4 could determine endoderm cell fate, be involved in the thymus and parathyroid domain formation or uphold the boundary between the two domains. To investigate these possible roles, we determined the expression pattern and function of Bmp4 during initial organogenesis in mouse embryos. To determine where Bmp4 is expressed, Bmp4lacZ embryos were collected and stained using x-gal. Through histology and three-dimensional reconstruction analysis, we determined that Bmp4 is expressed ventral-posterior in the third pharyngeal pouch and shared primordium at E10.5 – E12.5. Due to the Bmp ligand and receptor presence in neural crest mesenchyme and endoderm cells, the direction of the signal is unclear. To clarify the Bmp4 signaling pathway, we generated a neural crest specific knock out of Bmp4 or the Bmp4 receptor, using a Wnt1Cre deleter strain. Histology of E12.5 Bmp4 receptor-specific knock out embryos revealed that the size of the thymus appears smaller than the thymus seen in control embryos and the parathyroid gland appears larger than the parathyroid in the control. In addition, Bmp4 knock out embryos revealed the phenotype of the thymus and parathyroid to be normal. Initial analysis of the phenotypes from these mice suggests that Bmp4 signaling plays multiple roles during early organogenesis.

Marcus Tullius Cicero: The Foundations of a Legal Education during the Roman Republic

Kevin Patrick
Dr. James C. Anderson, Department of Classics, University of Georgia

Marcus Tullius Cicero, a prominent Roman lawyer and statesman, often alludes to the foundations of a legal education during the Roman Republic. “Marcus Tullius Cicero: The Foundations of a Legal Education during the Roman Republic” investigates Cicero’s references to a legal education, which surface in Cicero’s various orations, letters, and philosophical treatises. An analysis of the

orations "Pro P. Quinctio" and "Pro Sex. Roscio Amerino" provides details on Cicero's earliest conception of a lawyer's duty. Cicero believed that a lawyer was obligated to serve the Roman state and to uphold the rights and privileges of individual Roman citizens. When Cicero was at the pinnacle of his public career, "In Catilinam" and "Pro Murena" illuminate the importance of proper ethical foundations for a lawyer. The philosophical works of Cicero, such as "De Oratore," emphasize the importance of a liberal education, especially mastering the art of rhetoric. Thus, a chronological investigation into Cicero's references regarding a legal education demonstrates that the study of literature and philosophy was pivotal for an aspiring lawyer. The foundations of a legal education were deeply rooted in the cultivation of honorable characteristics. In the words of Cicero, the legacy of a proper legal education was that "the remembrance of our names should not pass away with life, but endure with all ages of the future."

How African Americans Think About the Links Between Disease and Race

Karen Petree
Dr. Celeste Condit, Department of Speech Communication, University of Georgia

The emerging field of pharmacogenics raises new questions about the relationships between genes, health, and race that need to be answered in order for drug development to properly benefit people of all genetic backgrounds. In particular, this research seeks to explore how African Americans think about the links between disease and race. The study contrasts participants' understandings of common diseases that are identified as particularly common in the African American community (diabetes and high blood pressure) with understandings of single gene disorders popularly identified as unique to the African American community (sickle cell disease). Twelve African American adults (7 males, 5 females) participated in semi-structured interviews, and their comments were coded into thematic categories by two independent coders. The results indicate that the most common cause to which high rates of diabetes and heart disease are attributed is distinctive African American diets (37.8%). In contrast, participants understand sickle cell disease as resulting from a genetic cause and therefore the largest group indicated that for a White person to have sickle cell they would have to have some African ancestry (36%). Such understandings or misunderstandings about disease can have a profound impact on a person's response to diseases and their treatments encountered within his/her community. Whether people are open to certain drugs or treatments is highly dependent on their perceptions of how diseases and drugs affect them in particular. This study has successfully identified a set of racially dependent medical perceptions, and also presents an analysis of the impacts of these perceptions in the field of pharmacogenics.

An Evaluation of Red Hat Inc.'s Business Practices, as it Relates to the Development and Distribution of Free and Open Source Software

Charlie Pitts, Jr.
Dr. Mark Huber, Management Information Systems, University of Georgia

In the global economy, supply and demand of computer software has an international reach and impact. Companies follow different paths for developing software for sell. Source code is the underlying ingredient of computer software. In most technology companies, source code is proprietary information and the source of the business value of the final product or service. Not all technology companies follow the proprietary source code model. Free software and open source software (F/OSS) are parts of movements in software development that allow for unfettered access to source code and the freedom to modify, copy, distribute and redistribute the source code.

F/OSS has advantages more suited for an interconnected world than traditional software development methods. F/OSS suffers from some of the same weakness and more than proprietary software. F/OSS products are maintained by an international community of people, non-profit entities and companies.

Red Hat Inc. (Red Hat) is one of the most successful companies whose business model includes the generation of value through the development and distribution of F/OSS. Incorporated in 1993, Red Hat has grown to report 3 million dollars in operating cash flows in the fourth quarter of FY2003.

The research methodology is a case study. I will triangulate news, financial reports, and other sources of information to see how Red Hat is achieving growth and technical excellence. I will use Porter Five Forces Model to examine the UNIX/Linux software and services market. Red Hat, as a case, is unique, but has the potential of disturbing the software industry.

The Discourse of Domestic Violence in the Latin American Community

Alison Powers
Dr. Vialla Hartfield-Mendez, Department of Spanish, Emory University

Latina victims of domestic violence and the organizations that assist them face a difficult set of challenges. Along with the language barrier and clash of American and traditional Latin American values, tension is created by the tenuous immigration status of many victims.

This project examines the discourse used by Latina victims to describe and deal with their experiences of violence. While principal emphasis will be given to the unique language of the victims, the study will also examine language used by advocacy agencies to discuss these sensitive experiences. Field work in the form of interviews and observations in Mexico City and in an Atlanta domestic violence support group provide data sources for the analysis. Information gathered in Mexico City provides a contextual reference and basis for analyzing the experiences of local Latina victims.

Since language is a specific product of a society as well as a universal product of human culture, a power structure is embedded and maintained through its use. Agencies must be aware that an important part of successful service is recognizing the significance of language and using it to restore a sense of autonomy and control to the victims. Organizations must avoid routine application of American usage, assumptions and values so as not to stifle or intimidate Latina victims. Informed use of language by agencies will facilitate the client's handling of her situation in a culturally relevant and appropriate fashion.

Information derived from the language analysis will be presented for discussion and incorporated into recommendations for agencies seeking to focus on providing services for the growing Latin American immigrant community.

Characterization of Chromosomal Integration by *Streptomyces* Bacteriophages: Use in Mammalian Genetic Engineering

Katherine Price
Dr. Janet Westpheling, Department of Genetics, University of Georgia

Recombinases (integrases) are enzymes that facilitate exchange between DNA molecules. Integrases derived by *Streptomyces* phages (viruses that infect these bacteria) have been shown to mediate efficient site-specific recombination in mammalian cells. Michele Calos and her colleagues at Stanford University have constructed cloning vectors containing *Streptomyces* bacteriophage integrases and used them to engineer mammalian chromosomes providing a safer nonviral approach to human gene therapy. Vectors containing the attachment sites of phages ΦC31 and R4 have been shown stably integrate into pseudo attachment sites found on mammalian chromosomes. We have recently isolated and characterized several new temperate phages from *Streptomyces* species and have begun an analysis of the mechanism of phage integration. Putative lysogens of phage MRT were isolated as turbid plaques and tested for the presence of phage by mitomycin C induction. Restriction analysis of released phage confirmed that the lysogens contained the phage used for infection. Libraries of phage MRT DNA are being constructed in non-replicating plasmid vectors to functionally identify the presence of the integrase gene and phage attachment site. Additionally, putative lysogens of phages DAH 1, DAH 2, DAH 4, DAH 5, and DAH 6 have been isolated and are being tested

for the presence of phage by the methods described above. Libraries of phage DNA will be made for those yielding positive results to functionally identify the presence of the integrase gene and phage attachment site. Our plans to manipulate these phage components for use in mammalian cell engineering will be discussed.

Cloning and Expression of a Trigger Factor Variant for Protein Folding Studies

Matt Rudy
Dr. Marly Eidsness, Department of Chemistry, University of Georgia

Trigger factor (TF) is a peptidyl-prolyl cis/trans isomerase (PPIase) and a protein folding chaperone. TF is a unique PPIase in that it binds to ribosomes at the exit site for newly synthesized proteins and may serve as a cotranslational folding chaperone. Protein biosynthesis on ribosomes is difficult to study due to the inherent asynchronicity of the process; ribosomes synthesize nascent polypeptide chains at variable rates. The goal of our research project is to ultimately visualize the protein folding process of a nascent polypeptide on a single ribosome. Our experimental design involves attaching a fluorescent molecule, called a fluorophore, to TF and a different fluorophore to the N-terminal amino acid of the newly synthesized protein and follow the interaction of the two fluorophores by fluorescence resonance energy transfer (FRET) measurements. This work describes the cloning of a TF variant encoding a site-directed cysteine residue at position 426 to make TF E426C in the vector pET28a. Expression of this TF variant generates a smaller peptide tag on the TF protein and will be useful for comparison to TF proteins expressed with larger peptide tags originating from a TOPO vector. Fluorophores attached to TF are designed to covalently bond to sulfur (from cysteine) via a maleimide based fluorophore to generate a thioether bond. The thioether bond is stable under reducing conditions of the cell-free expression experiments we use to study protein folding. TF has no naturally occurring cysteines, so TF mutants with specifically inserted cysteine residues allows attachment of fluorophores at desired points in the polypeptide chain. The goal of this paper is to describe the process of constructing a clone of TF E426C in the vector pET28a . Understanding how proteins fold is important because a protein's three-dimensional structure determines whether or not it can function properly. Protein misfolding is responsible for diseases such as Alzheimer's. If successful, the fluorophore attachment procedure applied to TF can be extended other proteins to help determine why protein misfolding occurs and how it can be treated or prevented.

***In Situ* Hybridization Detection of *Babesia microti* in Experimentally Infected Hamster Tissues**

Amy Sexauer, Fernando Torres-Vélez, Corrie Brown
Dr. Corrie Brown, Department of Veterinary Pathology, University of Georgia

Babesiosis is an emerging tickborne disease of humans, caused by the parasite *Babesia microti*. Clinical manifestation can range from asymptomatic and/or transient flu-like symptoms to acute and fatal, with this extreme exhibiting symptoms similar to malaria, including fever, chills, malaise, anemia, and fatigue, occurring most commonly in the elderly, immunocompromised, or splenectomized individuals. The reservoir is assumed to be field voles. Hamsters have proven to be a good experimental model of infection for this parasite. In this study, formalin-fixed, paraffin-embedded blocks from five hamsters experimentally infected with *Babesia microti* were examined by *in situ* hybridization to determine sites of replication of the parasite. A digoxigenin-labelled negative-sense riboprobe corresponding to the 16S ribosomal subunit gene was constructed and applied to the tissue sections. Using this technique, *Babesia microti* rRNA was detected in red blood cells throughout the body, as well as in Kupffer cells of the liver and fixed macrophages in other organs. These data indicate the presence of an extraerythrocytic phase of *Babesia microti*, which has been suggested but never before conclusively demonstrated. Demonstration of an extraerythrocytic phase in the life cycle of

Babesia microti has significant potential implications for further research into the interruption of transmission cycles of the parasite through the development of new drug therapies.

Utility and Revealed Preferences: An Analysis of Political Decisions through Voting Procedures in the Context of Economic Decisions through Market Mechanisms

Katherine Sheriff
Dr. Robert Grafstein, Department of Political Science, University of Georgia

The underlying notion of utility in decision making, that there exists differing intensities of any subject's preferences, provides more information about what is truly desired than a general ranking of the subject's preferences. However, due to difficulties in interpersonal utility comparisons, utility is used to explain rather than determine social and economic choices. Paul Samuelson's (1938, 1947) theory of revealed preferences explained that, because utility comparisons remain unknown, utility should be used to explain empirically demonstrated choices. The problem of implementing interpersonal utility comparisons in voting procedures presents a normative quandary for scholars of social choice. The purpose of this research is to determine the extent to which economic decisions offer insights into the use of utility comparisons for voting procedures.

Although seemingly disparate, political decisions through the voting method and economic decisions through market mechanisms reveal similar coordination patterns in a utility sense. Through a parallel analysis of such decisions, structural similarities were evaluated politically across societal preferences for voting, as well as economically across time for inflation and across nations for comparative advantage. Analysis results indicated that political and economic decisions may be compared successfully due to structural parallels. However, one fundamental exception to such similarities exists in the interpreted value of interpersonal utility comparisons, or lack thereof, relative to political and economic decisions.

Distribution of MMP-2, -9 and -19 Alternative Splice Variants in Pre-Neoplastic Ovarian Surface Epithelium and Ovarian Cancer Cell Lines

Adam Singer, Susanne Warrenfeltz, John Duvall
Dr. J. David Puett, and Chindo Hicks,
Department of Biochemistry and Molecular Biology, University of Georgia

Recent studies suggest that alternative splicing of normal genes may lead toward events associated with the progression of cancer such as transformation or metastasis, events in which the matrix metalloproteinases (MMP's) play a key role. The gonadotropic hormones, which stimulate ovulation through the up-regulation of MMP's, are implicated in the transformation of ovarian surface epithelium. This purpose of this project is to verify if alternative transcripts of the MMP family members exist in pre-neoplastic ovarian surface epithelium and ovarian cancer cells, to discern trends in the splicing events and to attempt to correlate these trends with transformation. RT-PCR was used in this project to search for alternative transcripts of MMP-2, MMP-9, and MMP-19. By selecting primers that overlap exon splice junctions, alternative transcripts were selectively amplified from three ovarian cell lines: one pre-neoplastic cell line, IOSE-398, and two neoplastic cell lines, OVCAR3 and SKOV3. Results indicated the presence of alternative transcripts in each cell line. The goal of this project is to fully characterize the distribution of single exon deletion splice variants of MMP-2, MMP-9 and MMP-19 in each cell line, and to test the hypothesis that these transcripts occur in nature by screening several ovarian tumors for the splice variants that occur in the cell lines. Differences in the distribution of splice variants across normal and transformed cells may represent a potential marker for ovarian cancer.

Does the Principle of Least Action Dispose of Dispositionalism?

Alexander J. Skiles
Dr. Yuri Balashov, Department of Philosophy, University of Georgia

My aim in this paper is to discuss whether the increasingly popular causal power or dispositionalist conception of natural lawhood and is undermined by the fact that physical systems obey certain natural laws difficult to expression in terms of causal transmission. In particular, I criticize those who infer the falsity of dispositionalism from what is sometimes called the principle of least action: a physical system's actual evolution is such that its time-dependent quantity of action over a given interval takes an extremum relative to other quantities of action it might have had. My argument is that dispositionalism neither conflicts with nor fails to explain why the principle of least action can be employed to derive accurate equations of motion. I conclude with a number of general strategies the dispositionalist can help herself to in order to resist similar objections couched in terms of conservation laws and global symmetry principles in physics.

Samuel Beckett and the Antinomies of Author and Audience

David M. Smith
Dr. Adam Parkes, Department of English, University of Georgia

My thesis will focus on the prose works of Samuel Beckett, with some excursion into his dramatic pieces and early critical essays. A major problem of Beckett's texts (which he deliberately exploits) is the relationship between the author and the literary audience. Many of Beckett's texts (especially The Unnamable) are constructed as a perpetual conflict between the author and reader which can never be resolved. I will examine approaches which have been proposed to understand this problem in Beckett; my own approach will focus upon what I take to be an anticipation of Beckettian problems in the aesthetic philosophy of Immanuel Kant. Kant attempts to resolve a number of "antinomies" (contradictions) which he claims have plagued philosophy and art. I argue that Beckett's conflict between his narrators and their audiences recapitulates Kantian antinomies; however, Beckett denies the possibility of resolving the conflict, which is the primary goal for Kant. I will not argue that Beckett was consciously aware of and influenced by Kantian aesthetics; rather, I will use Kant as an interpretative background to explain certain themes in Beckett. Through the comparison with Kant, I will demonstrate Beckett's connection to greater concerns of the Western tradition, in contrast with critics who interpret Beckett as an insular, solipsistic writer.

Projecting a Positive Educational Experience for Latinos in Georgia

Desiree Smith
Dr. Roberta Fernandez, Department of Romance Languages, University of Georgia

As Georgia continues to experience massive demographic growth in its Latino population, Latinos are accessing higher education at a lower rate than other groups. Institutions of higher education, in particular, have a unique opportunity to bring about widespread change. My study includes a "Literature Review" presenting the major themes found in the research about the educational experience of Latinos, as well as a section discussing two established programs that have increased Latino access to higher education. By conducting interviews of some Latino students attending the University of Georgia, I have identified factors that enhance the college experience of these students. I transcribed each interview and analyzed the data using qualitative research methods; then after categorizing and coding the data, I presented the major themes in the "Findings" section. Such findings include the critical role that support systems play in the acceptance, retention, and positive educational experiences of the Latino students who do attend college. In order to increase enrollment of Latinos in post-secondary institutions in Georgia, new initiatives, which I identify, must be taken at all levels of education, and current projects must continue to be funded.

Pancreatic Lesions in Chickens Experimentally Infected with Newcastle Disease Viruses of Different Virulence

Matthew Stewart, Nobuko Wakamatsu, Daniel J. King, Bruce S. Seal
Dr. Corrie C. Brown, Department of Veterinary Pathology, College of Veterinary Medicine, University of Georgia

Newcastle disease is a highly contagious poultry disease caused by varying strains of Newcastle disease virus (NDV). NDV has been classified according to five pathotypes that relate to the disease signs produced in infected fully susceptible chickens. The pathotypes of NDV, in increasing virulence, are asymptomatic enteric (avirulent) strains, lentogens, mesogens, and neurotropic and viscerotropic velogens. In this study, groups of White Leghorn chickens were inoculated intraconjunctivally with four isolates of NDV: California exotic Newcastle disease virus (CA END virus) - isolate from chickens during the 2002-2003 California outbreak (viscerotropic velogen), Beaudette C (neurotropic velogen), Anhinga (mesogen), and La Sota (lentogen). Birds were euthanized with collection of pancreatic tissues for histopathologic examination and immunohistochemistry for NDV nucleoprotein, along with two apoptosis assays. As negative control birds did, birds infected with La Sota and Anhinga had no viral infection in the pancreas with minimal apoptosis of pancreatic exocrine cells. Viral protein was detected in the pancreas from the birds infected with CA END virus and Beaudette C. By 3 days post inoculation, pancreatic exocrine cells and infiltrating lymphocytes and macrophages were infected with CA END virus. However, Beaudette C was detected only in pancreatic exocrine cells by day 6 postinoculation. Along with presence of viral protein, there were increased numbers of apoptotic cells in the pancreas from birds with CA END virus and Beaudette C. It was concluded that pancreatic apoptosis is associated with virulent NDV infection in chickens and may be a direct result of cellular infection. In addition, there may be a different mechanism of damage for the viscerotropic and neurotropic velogens. Clinical signs seen in chickens infected with virulent NDV, such as diarrhea and decreased egg production, may be associated with pancreatic damages.

Child Attentional Control in the Classroom Milieu

Christopher Stokes
Dr. Randy Kamphaus, Department of Educational Psychology, University of Georgia

Temperament theory suggests that one component of child mental health, attentional control, may either promote or interfere with academic achievement. Attentional control is the ability to orient, sustain, and shift attention (Posner & Rothbart, 2000). In a prior study, a key difference between student mental health groups (classified as low versus moderate mental health problems) was found: the moderate behavior problem group had more inattentional difficulties. These results were interpreted as supportive of temperamental theory implicating poor attentional control as adversely impacting daily classroom behavior which, in turn, adversely impacts academic achievement. The causes and contributors to attentional control problems, however, are not well studied and potentially myriad (e.g. intrauterine cocaine exposure; Mayes, 2003). This pilot study will assess the potential contribution of a heretofore unstudied contextual variable, the average level of child inattention in the classroom. It is hypothesized that average inattention in third grade classrooms (N = 25 for each of 5 classrooms for a total of approximately 125), as assessed by teacher's ratings of inattention for all children, will be correlated with target children's inattention (assessed by aggregated daily observations of inattention taken over a one month period) in these same classrooms (N = 25 across all five classrooms). A statistically significant relationship between average classroom inattention and target children's inattention will suggest that the contextual variable of inattention in the total milieu requires further research as a potential contributor to the development or exacerbation of an individual's attentional control in the classroom.

The Socialization of Anger among Maltreating and Nonmaltreating Mothers

Shana Strickland
Dr. Kimberly Shipman, Department of Psychology, University of Georgia

The purpose of this study is to investigate the emotional socialization practices of maltreating mothers and the effects on their children. The study specifically looks at how mothers socialize their children's anger and the regulation and coping skills those children use when they are angry. The sample consists of 40 maltreating mother-child pairs from the Department of Family and Child Services and a control group of nonmaltreating families that were recruited from community agencies. In this study, maltreating mothers are defined by specifically being physically abusive and nonmaltreating mothers had no instances of physical abuse or any other type of child maltreatment. The emotional socialization practices for the emotion of anger are compared by using the Meta Emotional Interview. Mothers will be compared on their awareness of their child's anger, the degree to which they accept this emotion and how they coach their child, and whether or not their child's expression of anger is regulated. It is hypothesized that maltreating mothers will be more aware of their child's anger, but less accepting and participate in less coaching of this emotion, causing their children to be more dysregulated than children from nonmaltreating families. The information obtained from this study will be useful for creating effective intervention programs for maltreating families by enhancing information on the socialization processes necessary for children's emotional development.

Drug and Nutrient Trafficking in the Human Pathogen *Cryptosporidium parvum*

Adam Stroupe
Dr. Boris Striepen, Department of Cellular Biology, University of Georgia

The gastrointestinal parasite *Cryptosporidium parvum* causes severe diarrhea, and in immunocompromised patients, cryptosporidiosis can become chronic and lead to death. Cryptosporidiosis is a pressing issue because there is no effective drug treatment for the disease. An unanswered question in the understanding of *C. parvum*'s drug resistance is how the parasite receives its nutrients: through the apical membrane or through the host cell. Knowing how the parasite receives its nutrients can provide a good target for drug trafficking; therefore, the flow of nutrient uptake was tested. In order for successful assays of drug and nutrient trafficking in *C. parvum*, the host cell, MDCK (canine kidney cells), grew in transwells until tight junctions allowed a complete monolayer to cover the porous membrane in the upper well of the transwell. Using different concentrations of MDCK cells and a voltmeter to check resistance between the upper and lower wells, the optimal time when the cells reach a complete monolayer was determined. The MDCK cells were successfully infected with 5 µl of *C. parvum* (1x105 cells). After the allotted time for infection, bromodeoxyuridine was added to the lower well of half the transwells to show uptake of nutrients through the host cell and the upper well of the other half to show uptake of nutrients through the apical membrane. After the selected time of exposure to bromodeoxyurdine, the cells were stained with a primary antibody that attaches to the incorporated bromodeoxyuridine and a secondary antibody that adds florescence to the incorporated area. This determined which *C. parvum* culture had a better uptake of the nutrients; unfortunately, the initial *C. parvum* concentration was inaccurate, making the microscopy results hard to determine. Nevertheless, the assay to set up transwell experiments with *C. parvum* was perfected, and future studies can determine the needed results.

Recruitment of Human Telomerase RNA to the Telomeres of Human Cancer Cells

Teerawit Supakorndej
Dr. Michael P. Terns, Biochemistry and Molecular Biology, University of Georgia

Telomeres cap the physical ends of eukaryotic chromosomes and protect them from end-to-end fusion and degradation. In most normal human somatic cells, telomeres become progressively shortened during DNA replication, leading to cellular senescence. The telomerase

ribonucleoprotein is responsible for telomere maintenance and elongation. The enzyme is inactive in most normal cells but is active in cancer cells, suggesting that it has important implications in tumorigenesis and cancer cell proliferation.

In humans, telomerase minimally consists of a catalytic reverse transcriptase subunit (hTERT) and an RNA subunit (hTR). In the telomerase-positive HeLa human cancer cell line, hTR accumulates in nuclear structures called Cajal bodies, the proposed site of telomerase biogenesis. However, little is known about the delivery of hTR from Cajal bodies to telomeres, where it serves as the template for telomeric repeat addition. We hypothesized that initial localization of hTERT to the telomere is required for hTR localization to the telomere. To test this, we generated stable telomerase-positive HeLa cell lines expressing fusion protein constructs consisting of telomere binding proteins (hTRF2 or hPot1) fused to hTERT. By relocating hTERT to the telomere through these fusion protein constructs, we observed that hTR in these stable cell lines accumulates in foci reminiscent in size and shape of telomeres. Ongoing experiments are being performed to determine if hTR redistributes to the telomeres in these cell lines, whether Cajal bodies also redistribute to the to the telomeres, and if hTR first exits Cajal bodies prior to associating with telomeres. Understanding the mechanisms involved in telomerase recruitment to telomeres is an important advancement of cancer biology.

Isolation of Mutants of *Arabidopsis thaliana* Having Insertions in Genes Thought to Encode Necessary Components of Plant Cell Wall Synthesis.

John Henry Theiss, Robert D. McCloskey Jr., Prashant Amin
Dr. Michael G. Hahn, Complex Carbohydrate Research Center, University of Georgia

The goal is to identify homozygous mutants in specific genes thought to be involved in the synthesis of cell wall polysaccharides. The focus is on mutants that have only one gene disrupted by the addition of a transforming-DNA (T-DNA) insert. The long-term goal of the project is to determine the function of the target genes and how they affect cell wall biosynthesis.

Arabidopsis thaliana was chosen for this experiment because its relatively small genome has been fully sequenced. Furthermore, it is easy to grow large numbers of *Arabidopsis*.

The gene targeted in this research (At1g53000) is believed to be a nucleotidyltransferase that synthesizes cytocen monophosphate 3-deoxy-D-manno-2-octulopyranosonic acid (CMP-KDO), an activated sugar nucleotide required for the synthesis of the pectic polysaccharide, Rhamnogalacturonan II (RG-II). RG-II is important in overall cell wall structure because there is evidence that RG-II cross-linking is required for the formation of pectin networks in plant cell walls.

The lab obtained two seed lots from the Salk Institute that are reported to have T-DNA inserts in At1g53000. Seed from each lot were grown and the plants tested, using polymerase chain reaction (PCR) and gel electrophoresis, for the presence of inserts. Salk_021554 was found to be without inserts. In contrast, our data show that some of the Salk_008109 plants have inserts in At1g53000. Interestingly, PCR data suggests the presence of two inserts in the gene, but the plants are all heterozygous for the mutation.
Seed from these heterozygous plants are being grown for the purpose of producing homozygous mutants, and confirming the existence of an extra insert. Once a homozygous mutant line has been isolated, further experiments to study the effect of this mutation on cell wall structure can proceed. This understanding will lead to benefits to the commercial, food, and metical community.

Trigger Factor (TF) Assisted Co-translational Folding Using Fluorophore Modified Nascent Peptides Synthesis and Characterization of Fluorophore-modified Trigger Factor for Protein Folding Studies

Tendoh Timoh
Dr. Marly Eidsness, Department of Chemistry, University of Georgia

Protein folding consists of complex mechanical processes that are conserved in all life forms, but poorly understood at the molecular level. Our ability to elucidate the structures and functions of proteins is a necessary step towards the eradication of most pathogens and genetic disorders in the development of therapies to combat protein-misfolding diseases. One particularly interesting protein in this ever-growing field of proteomics is the trigger factor (TF) of *Escherichia coli*. Our laboratory works with this bacterial prolyl isomerase, trigger factor (TF). Prolyl isomerases are involved in protein folding, as they catalyze the *cis-trans* isomerization of the peptide bond preceding proline in proteins. TF is an anomalous unique prolyl isomerase because it is the only one known to bind to ribosomes, the biological machines that synthesize proteins. We study its TF function role in the folding of newly synthesized proteins, called cotranslational folding. With very little being known about the stages of cotranslational folding, our group uses cell-free coupled transcription/translation to study cotranslational folding of nascent polypeptides. We are building a two-fluorophore cell free translation system by that incorporatesing probes into a nascent polypeptide and ribosome- bound TF. During cell-free translation, these probes will be detected by fluorescence resonance energy transfer spectroscopy (FRET), a technique that is sensitive to distance between fluorophores during cell-free translation. In this work, the synthesis and characterization of fluorophore-modified TF is described, in which the fluorescent dye, Alexa Fluor568, is covalently attached to a single cysteine in the TF variant, TFE426C (f-TF). New experiments will require that we continue to learn experimental methods of protein bioconjugation, and gain experience with peptidyl prolyl *cis/trans* isomerase (PPI) assays and fluorescence measurements of f-TF. Prolyl isomerase assays of f-TF are described as well as fluorescence measurements of f-TF and f-TF in a 1:1 complex with ribosomes.

Establishing a Tumor Marker Database through Chemiluminescent Immunoassay Analyses

Tyson Turner, Marcelo Rocha da Costa, Robert S. Galen, and Dr. David Puett, Department of Biochemistry and Molecular Biology and School of Pharmacy, University of Georgia

Early diagnosis of cancer, before clinical symptoms appear, is proven to save lives and is aided by the detection of tumor markers in the serum of patients suspected of having cancer. Tumor markers, biomolecules whose presence or absence in human blood correlates with a patient's disease status, can be detected in serum via chemiluminescent immunoassays. The work reported herein describes a database of tumor marker serum levels that can function as an integral tool for correlating tumor marker levels with the incidence of cancer. Serum samples were obtained from Athens Regional Medical Center, and the concentrations of three markers, human chorionic gonadotropin (hCG), carcinoembryonic antigen (CEA), and alpha fetoprotein (AFP), were measured using the Immulite 1000. The results were compiled into an Excel database. The levels of each tumor marker were quite varied, ranging from values of hCG as high as 133,597 mIU/ml to less than 1.0 mIU/ml, values of CEA from 7.1 ng/ml to 0.2 ng/ml, and concentrations of AFP from 123 IU/ml to 0.5 IU/ml. Limited access to patient information is available and will be used to correlate serum levels of each tumor marker with patient diagnosis and disease status. This research is ongoing as more serum samples are collected and tumor marker levels are measured and recorded.

Genetic Investigation of *Salmonella* Samples Found in Livestock

Katrin Usifo
Dr. Susan Sanchez, Athens Diagnostic Laboratory, University of Georgia

Antimicrobial resistance is a public health problem of growing concern. Many pathogenic organisms have become multidrug resistant as a result of their exposure to various antibiotics. The emergence of multidrug-resistant *Salmonella* is linked to antibiotic use on animals raised for food. Research was conducted to investigate the distribution of *Salmonella* containing multidrug-resistant genes from Georgia farms. Samples were gathered from livestock from four Georgia farms. An average of 4 samples were taken from each animal or location. A total of 171 isolates were confirmed to be *Salmonella*. The Southern Blot technique was used as a primary method of analysis for presence of *ampC*, *flo*, and *tetA* genes corresponding to resistance to ampicillin, florfenicol, and tetracycline, and samples that were difficult to interpret as positive or negative were confirmed by PCR. Of the Salmonella samples tested, 42% contained ampC gene, 34% contained flo gene, and 23% contained tetA gene. Twenty-five percent of samples from Dairy Farm 1 were positive for *ampC*, *flo*, and *tetA*. Seventy-two percent of samples from Dairy Farm 2 were positive for *ampC*, and 55% for *flo* and *tetA*. Sixteen percent of samples from Dairy Farm 3 contained *ampC* gene and 33% contained flo and tetA genes. All samples tested from Dairy Farm 4 were negative for *flo* and *AmpC* genes and 22% tested positive for *tetA*. Further testing will be conducted to determine the resistance profile on remaining samples. Overall, *ampC* gene seems to be the most common among *Salmonella* isolated from cattle in Georgia at 42%. There is not a direct correlation between the use of antibiotics and the presence of resistance.

Characterization of Transgenic Mice Expressing a Genetically Altered Luteinizing Hormone Receptor

Javier Valle, Frank J. Michel
Dr. Prema Narayan, Department of Biochemistry and Molecular Biology, University of Georgia

Luteinizing hormone (LH), human chorionic gonadotropin (hCG), and follicle stimulating hormone (FSH) comprise the group of gonadotropins that is essential for sexual development in humans. LH is secreted from the anterior pituitary and hCG is secreted from the placenta. Both bind to a common G protein-coupled receptor (LHR) present in the Leydig cells of the testis or theca cells of the ovary and induce steroidogenesis. Constitutively activating luteinizing hormone receptor (LHR) mutations occur naturally in humans, resulting in a clinical disorder termed gonadotropin-independent precocious puberty. The aim of this study was to characterize the phenotype of a line of transgenic mice expressing a genetically engineered mimic of a constitutively active LHR made from an hCG-LHR fusion gene construct (yoked hormone receptor, YHR) and compare the findings with previously characterized lines of mice expressing the same YHR transgene. The experimental group of mice expressing this altered receptor (YHR+) was compared to control group littermates (wild-type, WT) before and after the age of puberty using hormonal and histological analyses. Male prepubescent transgenic mice displayed increased testosterone levels and seminal vesicle weights, along with reduced serum FSH levels compared to WT controls. Prepubescent, female transgenic mice exhibited an increase in ovarian estradiol levels and uterine weights and reduced serum LH and FSH levels compared to their pre-pubertal control group littermates. These results demonstrate that YHR is functional in vivo and are consistent with similar findings of a recent characterization of another line of YHR transgenic mice; therefore, these lines of YHR transgenic mice will be a useful model to study reproductive effects of premature LHR activation.

The Effect of Communism on Eastern European Literature: With a Focus on Ivo Andric, Wislawa Szymborska, and Ismail Kadare

Jora Vaso
Katarzyna Jerzak, Department of Comparative Literature, University of Georgia

In the works I have read this summer, one can see the reflection of the intensity of communist regimes in the respective countries. Ironically, all three writers, who end up as dissidents or exiles, were originally devoted Marxists. In Kolakowski's assessment, this ironic situation is justified by the impossibility of translating the theory of Marx into successful practice. Out of the three countries that I have researched, Albania emerges as the most totalitarian. This may be due to the lack of independence throughout Albanian history, before and after Communism. In effect Albania went straight form feudalism to Communism. This is very much reflected in Kadare's prose, the metaphors and allegories he uses in most of his work, e.g. The Ottoman Empire, in The Palace of Dreams, is a transparent metaphor for Hoxha's Albania. His continuous use of Communism as a background to all of his novels reveals the severity in which Communism affected Albania which is in turn reflected in his writing. More so than the other two writers, Kadare is unable to look past such a major part of Albanian history. His inability to look beyond Communism puts him in stark contrast to Andric and Szymborska. Andric's "chronicles" use historical past to show that the identity of a country remains constant throughout even the most dramatic political upheavals. Though Andric does not specifically mention Communism in his book The Bridge on the Drina, one can easily see that the bridge is similar to Bosnia in that it remains standing while different occurrences pass through. Among the writers I considered, Andric was clearly the least controlled one—his writing did not suffer any major changes after Communism became the official system in Yugoslavia. This is because Yugoslavia remained the most independent communist country in the Soviet bloc. This independence is reflected on Andric's work which remains unchanging even after Communism. This lack of change is due to the fact that Andric's "chronicles" and short stories focus more on the centuries of turmoil in the Balkans, rather than a specific system of government which never remains constant. It is for this reason that Andric's work will never become irrelevant. Communism in Poland, although not as tolerant as in Yugoslavia, never reached the extremes it did in Albania. Szymborska, who experienced the transition to Communism as a young woman, seems to be the one who was most disappointed by the reality of the new system. She experienced both extremes—that of communist idealism and then utter disillusionment—of the harsh system. As a result, she left the Communist party and devoted herself to more universal ideas. Paradoxically, her distancing herself from Communism and politics in general resulted in her poetry having a more universal expression and appeal. Of the three writers she is the most accessible to the Western reader because her writing depends the least on the particulars of Polish history and politics. To conclude, it appears that Communism has produced a nearly hermetic literature that requires a Western reader to know its historical and political background. Ismail Kadare has suffered the most as a writer. Though many of his books are critiques of Communism, the aggressive and totalitarian Communism which took place in Albania has more power on the writer than the other way around. Ivo Andric's work is not affected by Communism more than by the long history of conflict in the Balkans. Szymborska's poetry is neither focused on politics, history, or her specific country. Though she naturally refers to Poland, her work remains broad in appeal. The challenge of post-communist literature in Eastern Europe will be to leave behind Communism as the permanent point of reference without losing its identity. Polish literature may have made it there already while the Balkans are still in the position defined by Andric half a century ago: on the border between the Eastern and the Western worlds. Communism has done its part to hinder its progression.

Arts Integration in School Curriculum as a Motivator for Student Success

Erika Vinson
Dr. Richard Siegesmund, Art Education,
University of Georgia

This study examines the promotion of academic and social competencies among middle and high school students through an integrated arts curriculum. The study focuses on Davidson Arts Magnet School, a grade 6 through 12 high school in Augusta, Georgia. Davidson is nationally ranked for academic achievement and a GRAMMY Signature School. The school combines high expectations for students with a cooperative, nurturing environment. The Georgia Systemic Teacher Education Program sees Davidson's curriculum that combines fine arts and academics as a possible state model for education.

This is a mixed methods study. Analysis of quantitative data gathered through standardized testing and numeric assessments (including grade point average and attendance records) will be used to support analysis by factors such as mastery of school curriculum and academic dedication. The analysis will also consider how socio-cultural status (reflected by and free and reduced lunch status) impacts learning. Qualitative data gathered from semi-structured interviews, which follow anthropological methods, with Davidson faculty and staff will illuminate the quantitative data and give a more descriptive picture of Davidson's overall environment and methods for success.

Davidson students, all of whom actively participate in the fine arts, exhibit significantly higher academic achievement, discipline, and self-motivation than students at traditional schools. This suggests that the fine arts contribute to the personal and educational development of children of all backgrounds and abilities. It appears that the arts instill a positive attitude toward academic achievement. Therefore the preservation of the fine arts in school curricula should be a top priority.

Examining the Balance of Social and Economic Priorities for Development in Post-Liberalization India: the Case of Kerala

Katherine Vyborny
Dr. Kavita Pandit, Department of Geography,
University of Georgia

The state of Kerala in southern India, governed alternately by Communist and Congress parties since independence, has presented a controversial alternative "model" for development, prioritizing social equity and public programs over economic efficiency. This project takes a closer look at the case of Kerala to explore how its traditional emphasis on social priorities over economic efficiency has experienced the new challenges of India's liberalization and the resulting greater exposure to the world economy. Since the beginning of India's economic liberalization in the 1980s and 90s, how have economic factors at the international, national, state, and local level interacted to affect Kerala's economy and wider development? The economic effects of this exposure, along with the level of human development already achieved, may change the priorities of the public, of elites, and as a result of government policy, to reflect a higher prioritization of economic efficiency over the social equity that has been emphasized in the past. Economic and social statistical indicators, government budget documents, content analysis of a sample of historical Kerala newspapers, and interviews with twenty-five key actors in Kerala address the question: what is the current influence of factors on global, national, state and local levels on public priorities for development, and what is the current balance of the goals of social and economic development in Kerala's public opinion, politics, and ultimately public policy? A preliminary review of the data seems to confirm that the international influences of globalization, the involvement of international lending institutions, and migration, as well as the economic changes of India's liberalization on a national level, have impacted Kerala's development, and in response to these forces and to the attainment of developed-world standards in many social indicators (such as the low infant mortality rate) have created a shift in public opinion towards an emphasis on increased

economic efficiency over continued social development.

HOPE Scholarship Eligibility and Retention Rates as a Function of High School Characteristics

Daniel Waldroup
Dr. David Mustard, Department of Economics, University of Georgia

Georgia's popular HOPE Scholarship Program uses state lottery funds to pay the in-state college tuition of any Georgia high school student who graduated after 1993 with at least a 3.0 grade point average in core classes. Students who continue to maintain a "B" average in college can renew the scholarship until they reach 127 semester hours of college credit. Despite the simplicity and straightforwardness of the scholarship's requirements, there is significant variation in HOPE eligibility and retention rates amongst students from different Georgia public high schools. Using econometric regression methods on data collected from approximately 325 Georgia public high schools between the 1996-97 and 2001-02 school years, this project seeks to determine how high school factors affect HOPE Scholarship eligibility and retention rates. Potentially influential high school factors such as size, racial composition, poverty rate, and standardized test scores will be analyzed for their individual effects on rates of eligibility and retention. Finally, having determined which high school factors are most associated with HOPE Scholarship eligibility and retention, the project will propose potential policy and educational changes that may increase student HOPE Scholarship achievement.

Glycopeptide Isolation and Glycosylation Site Identification: A Standardized Procedure

Nicole Warren
Dr. Michael Pierce, Biochemistry and Molecular Biology, University of Georgia

The primary aim of the experiments described in this paper was to develop a standardized procedure to efficiently isolate and identify glycoproteins and their associated N-linked glycosylation sites. The significance of these experiments resides in the possibility of using this procedure to analyze complex glycoprotein mixtures such as human serum and experimentally observe their relevance as biomarkers for disease. This standardized protocol will provide a more efficient way to identify glycopeptides by preventing certain side reactions, such as protein carbamylation in the presence of urea, that interfere with the efficiency and quality of experimental data. In the initial stages of experimentation, three dilutions of bovine thyroglobulin (bThg) were used in order to observe the minimum amount of the protein that is required for detection of associated glycosylated proteins. Glycopeptides were isolated from bThg by a series of steps including proteolysis to fragment the denatured protein, lectin affinity chromatography to select for specific glycopeptides, and enzymatic deglycosylation to excise glycans from glycoproteins. Matrix Assisted Laser Desorption/Ionization (MALDI), Liquid Chromatography-Mass Spectrometry (LC-MS/MS, and data analysis using Masslynx software followed by use of the MASCOT database for protein sequencing were used to analyze and sequence experimental data. Of the three dilutions, consisting of 10mg, 1mg, and 0.1mg of bThg, N-glycosylation sites were observed with the glycoprotein's in the 10mg and the 1mg samples. The effectiveness of this procedure to identify individual glycopeptides from different proteins was then tested with mixtures of bThg and transferrin (Tf), proteins that are both contained in human serum. In conclusion, the protocol was successful for the efficient identification of both types of glycoproteins.

Creation of an *in vitro* Transcription System for Mycobacterium tuberculosis

Alyson Weber
Dr. Russell Karls, Department of Infectious Diseases, University of Georgia

Mycobacterium tuberculosis, the causative agent of tuberculosis (TB), is a highly successful human pathogen. Each year, an estimated ten million cases of active TB result in two to three million deaths worldwide. Studies indicate that SigC, one of twelve secondary sigma factors in

M. tuberculosis is required for pathogenesis in animal models of TB and therefore likely to be important for human disease. Expression of several genes is altered in a strain lacking SigC relative to a SigC+ strain. Establishing an *in vitro* transcription system will aid in identifying those genes directly transcribed by SigC as the gene products may be virulence factors that could serve as vaccine targets. An *in vitro* transcription system requires: core RNA polymerase (RNAPcore), a sigma factor that transiently associates with RNAPcore enabling the enzyme to bind at specific DNA sequences (promoters) and initiate trancription, a DNA template containing a promoter, and ribonucleotide triphosphate substrates. RNAPcore will be isolated from *M. smegmatis*, a related but nonpathogenic mycobacterium. RNAPcore consists of four subunits: 2□□and□′, encoded by the *rpoA*, *rpoB*, and *rpoC* genes, respectively. RNAPcore will be isolated by carboxy-terminal fusion of RpoC to 10 histidines (His-tag) for nickel affinity purification. The primary *M. tuberculosis* sigma factor, SigA, and SigC will be purified as amino-terminal His-tag fusion proteins in an *Escherichia coli* expression vector. SigA will serve as a positive control for *in vitro* transcription as many drug resistance genes have promoters that are recognized by the primary sigma factors in bacteria. Putative *M. tuberculosis* SigC and SigA promoters will be cloned onto a plasmid upstream of a transcription terminator to yield small *in vitro* transcripts that can be sized on denaturing acrylamide gels to determine their start sites. Progress toward development of this system will be presented.

Assessing Correlations Between Elite Media Coverage and Movement in Public Opinion Polls During Presidential Elections

Matthew Weiss
Dr. Audrey H. Haynes, Department of Political Science, University of Georgia

Media pundits speak regularly about which candidate is winning the media spin cycle. While this contest receives significant attention from the talking heads on cable news channels, does positive and negative news coverage really have an impact on public opinion polls and, subsequently, the results of an election? Previous research has suggested that media coverage can correlate to shifts in candidate support during a presidential election. Additionally, coverage of candidates regarding specific issues such as the economy has been proven to impact public preferences of candidates on those issues. Was this phenomena replicated during the 2004 presidential election and, if so, does it also exist for non-economic issues? The purpose of this research is to analyze the content of newspaper articles during the five months preceding the 2004 election in order to determine whether shifts in the tone of newspaper coverage correlate with a subsequent shift in the poll standings of either presidential candidate. Additionally, the research will attempt to determine whether such a correlation exists between newspaper coverage and poll standings for specific policy areas such as the war in Iraq and the strength of the economy. The findings of this research could play an important role in upcoming elections by determining how important it is for candidates to 'spin' news developments in order to influence media coverage. Further, such research may indicate whether specific political circumstances or a focus on specific policy areas can impact the strength of the correlation between media coverage and public opinion polling.

Antimicrobial Resistance in Salmonella of Bovine Isolates in Georgia

Lindsay Marie Williams
Dr. Susan Sanchez, Athens Diagnostic Laboratory, University of Georgia

Salmonella enterica is a destructive infectious disease, and it causes tens of thousands of infections per year in humans. Antibiotic treatment of this bacterial infection is often ineffective due to antibiotic resistance. The use of antibiotics in food animals has been blamed for the emergence of *Salmonella enterica* strains resistant to those particular antibiotics or to other antibiotics used in the same human class. There have not been comprehensive studies of farms to date to determine if the prophylactic use of antibiotics is associated with the presence of antibiotic resistant *Salmonella*. The phenotypic

antibiotic resistance profile from 91 *Salmonella* isolates obtained from four different farms as part of a prospective comprehensive study were analyzed using minimum inhibitory concentrations (MIC). The antibiotics tested were, spectinomycin, ampicillin, amoxicillin-clavulanic acid, cephalothin, ceftiofur, trimethoprim, ticarcillin, difloxacin, tilmicosin, enrofloxacin, florfenicol, gentamicin, orbifloxacin, and tetracycline. *Salmonella enterica* samples were isolated from animals and their surrounding environments in four different farms in Georgia. In total, 91 isolates were tested (Farm 1: 7 environmental isolates; Farm 2: 45 isolates; Farm 3: 21 isolates; Farm 4: 18 isolates, 8 of those from the environment). Farm 1 showed 100% resistance to spectinomycin, tilmicosin, florfenicol, and tetracycline; 30% to ampicillin, amoxicillin-clavulanic acid, and cephalothin. Farm 2 showed 100% antibiotic resistance to ampicillin, amoxicillin-clavulanic acid, cephalothin, ceftiofur and florfenicol; 98% to tetracycline, 84% to spectinomycin 86% to gentamicin, 22% to ticarcillin, and 7% to trimethoprim. Farm 3, showed the following resistance, 67% to tetracycline, 57% to amoxicillin-clavulanic acid, 14% to ticarcillin, 43% to spectinomycin, 33% to ampicillin, and 24% to trimethoprim and florfenicol. Farm 4 showed almost no antibiotic resistance in the ten samples tested, with the exception of tetracycline (60%). Resistance to tetracycline seems to be consistently high in the *Salmonella* isolates from all the herds tested. However, resistance to certain antibiotics such as ceftiofur and florfenicol seems to be exhibited exclusively on individual farms. Resistance phenotypes seem to be associated with farm management practices.

Georgia's Environmental Literature: A Survey of Contemporary Works

Leslie S. Wolcott
Dr. Betty Jean Craige, Department of Comparative Literature, University of Georgia

This paper surveys recent literatures concerning the land and environment of Georgia from an ecocritical perspective. Though stories and accounts of Georgia's natural features have existed for hundreds of years, few if any scholars have examined the works as a cohesive group. My paper analyzes representative narrative, nonfiction, biographical, scientific, and journalistic literatures of recent years, and attempts to identify the environmental problems and solutions displayed throughout the works. In addition, this paper illustrates the importance of knowledge and education of and literature about the environment in attempts at conservation and preservation of Georgia's landscapes, renewable and nonrenewable resources. This project was inspired by my interest in environment and literature as well as the emerging field of ecocriticism. Dr. Betty Jean Craige of the Environmental Ethics and Comparative Literature departments provided resources and guidance, and the project was made possible by the CURO Summer Research Fellows program at UGA.

Regulation of Branched-chain Amino Acid Catabolism in *Streptomyces coelicolor*: Applications for Metabolic Engineering of Polyketide Antibiotic Biosynthesis.

Fei Yang, Ondrej Sprusansky, Karen Stirrett and Dr. Janet Westpheling, Department of Genetics, University of Georgia

Mutants of *Streptomyces* defective in the catabolism of the branched chain amino acids, valine, leucine and isoleucine, are also defective in antibiotic production, suggesting that some of the precursors for antibiotic synthesis come exclusively from this carbon utilization pathway. *Streptomyces*, a common soil bacteria that produce most of the natural product antibiotics used in human and animal health care, are unique among bacteria in that they have two pathways for branched chain amino acid degradation. These two gene clusters, *bkdA2B2C2* and *bkdA1B1C1*, each encode an apparently identical branched-chain amino acid dehydrogenase enzyme complex.

BkdR is a transcriptional regulator of the *bkdA2B2C2* cluster and the focus of the project is to understand the mechanism of this regulation. Analysis of the *bkdA2B2C2* shows that the cluster is transcriptionally active at the initiation of morphogenesis and antibiotic production. To investigate the mechanism of

BkdR regulation, a reporter gene fusion between the *bkdA2* promoter and the *xylE* reporter gene has been constructed. The *xylE* gene encodes a catechol dioxygenase that converts colorless catechol to a yellow oxidation product and will allow the rapid assessment of *bkdA2* mutations that affect regulation. Located within the regulatory region of this promoter is a nearly perfect 14bp inverted repeat sequence that might be a *BkdR* protein binding site. To test this hypothesis base changes will be introduced throughout the 14bp inverted repeat using site directed mutagenesis. To support the results of these experiments gel mobility shift experiments will be preformed on potential binding site mutants with purified *BkdR* protein. This work will contribute to the understanding and eventually the manipulation of an important metabolic pathway that leads to antibiotic production in these complex and interesting bacteria.

Analysis of the Interactions Between Chondroitins and Pectins

Stephanie Yarnell
Dr. Carl Bergmann, Complex Carbohydrate Research Center, University of Georgia

Glycosaminoglycans (GAGs) are naturally occurring, heterogeneous, negatively charged, and N- acetylated, unbranched polysaccharides. Chondroitins are one of the four main classes of GAGs. The role of chondroitins in the extracellular matrix has been extensively studied. They contribute to the general structure and permeability properties of connective tissues and have been implicated in binding of pathogens to particular target cells, maintenance of cellular activities, and development of metastasis in cancer cells. In the peripheral nervous system, chondroitins are implicated in the rebuilding of damaged schwann cells and reconnecting severed inputs to schwann cells from astrocytes, but have also been implicated in markedly slowing the axonal regeneration in the distal segment of neurons.

Pectins are acidic, matrix polysaccharides that are primary structural elements of the matrix of the plant cell wall, and have been implicated in morphogenesis, pH regulation, ion balance, wall permeability, and plant defense. Thus, chondroitins and pectins serve similar functions within their respective organisms.

We have noted that enzymes that cleave chondroitins and those that degrade pectin share structural similarities, and enzyme structure is often driven by the three dimensional structure of the substrate. The similarity in function of GAGs and pectins, and the structural similarities of the enzymes that degrade them, led us to wonder if these were clues that could shed light on the mechanism of the role of pectins in human health. We therefore investigated the effects of chondroitins on selected pectin degrading enzymes, and of pectin on chondroitinases. Effects on both enzyme structure and activity were observed.

Civil Rights Figures Appearing in the Multicultural Archive of Georgia

Rafael R. Young
Dr. Timothy Powell, Department of English, University of Georgia

The Multicultural Archive of Georgia is a collaboration of Dr. Barbara McCaskill and Dr. Timothy Powell of The University of Georgia. The website archives pictures, stories, and digital media concerning the historic presence and roles of African and Native Americans in Georgia. Dr. McCaskill and Dr. Powell began this project intending to create a much needed website for teachers to use when teaching the history of minorities in Georgia. They intend to have the website added to Georgia's Quality Core Curriculum. The website is currently online and can be found at www.mcgeorgia.uga.edu.

I viewed several video tapes about the Civil Rights Movement taken from the Walter J. Brown Media Archives. Next, I chose nine pertinent clips, including figures such as The Rev. Dr. Martin Luther King, Jr., giving various speeches, James Meredith at the University of Mississippi, and Robert Kennedy discussing the Freedom Rides. I used other videos, books, and microfilm to provide information about what was happening and why each clip was important in brief paragraphs. These brief descriptions

will appear with each clip on the website so that both students and teachers can quickly identify which clip they need.

The clips and information found are important because they bring together three highly important organizations. These findings will not only appear on the Multicultural Archive of Georgia, but will also be placed in the Digital Archive of Georgia and the New Georgia Encyclopedia. This work heads future collaborations between the three groups.

Efficiency of Low-Cost Airline Carriers in a Deregulated Environment

Anne Zimmerman
Dr. David Kamerschen, Department of Economics, University of Georgia

The airline industry has suffered major blows since deregulation in the late 1970s and early 1980s. Deregulation resulted in the failure of many major airlines, such as Eastern, and the springing up of new low-cost carriers. Today, United Airlines, American Airlines and other North American carriers have filed for Chapter 11 bankruptcy in order to compete with low-cost airlines and survive in the competitive aviation environment. This study examines the economic secret behind the success of low-cost airlines and argues that they are best suited for the current flying industry. The focus is on Southwest Airlines, a Texas-based airline, which has managed to defy tradition and report an astounding fifty-five consecutive quarters of profitability. Southwest, the original low-cost carrier, has been emulated by numerous newer airlines such at JetBlue Airways. The paper examines data on industry ticket pricing, fuel costs, plane capacity, route choice, as well as other business success indicators. Operating profits and losses among network and low-cost carriers will be compared. Charts detailing airline cost and revenue per passenger mile will also provide valuable data analysis. Some factors influencing the accomplishments of Southwest include the invention of the two-tier pay system, choice of airports, efficiency, controlled growth, and a 'no frills' philosophy. As Chapter 11 bankruptcy filings persist and airlines restructure their business plans, the industry will continue to evolve and adapt to meet competition. Established major carriers of the past must understand the factors vital for profitability. They must continue emulating low-cost carriers such as Southwest if they plan to remain in business.

CURO

Center for Undergraduate Research Opportunities

Symposium 2006

April 10, 2006

Tate Student Center & Student Learning Center

Program and Book of Abstracts

Creating a Culture of Undergraduate Inquiry

The Honors Program's
Center for Undergraduate Research Opportunities

2006 Symposium Program and Abstracts

CURO Office
203 Moore College
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Table of Contents

CURO
Center for Undergraduate Research Opportunities

Symposium 2007

University of Georgia
Tate Student Center & Student Learning Center Fourth Floor Rotunda
April 9, 2007

CALL FOR ABSTRACTS

The Center for Undergraduate Research Opportunities at the University of Georgia provides a forum for all undergraduates to present original research and creative works sponsored by faculty members. Undergraduate students from all disciplines are encouraged to participate. Representatives of public and private higher education institutions in Georgia are encouraged to apply.

Presentations may be in the form of an oral presentation, poster session, exhibition, performance, or work of art. Students can also present a tutorial about a research methodology or new technology. Undergraduate researchers who are at various stages of the research process are encouraged to submit abstracts describing where they are in the research process and the issues they face. Those who wish to present their work should submit an application and an abstract of a maximum of 250 words (via the CURO web site) and a brief supporting letter from the sponsoring faculty member no later than January 12, 2007. Group research projects should be submitted with one application and one letter of faculty support. All abstracts will receive graduate student peer review with faculty guidance. All participants accepted into the Symposium will be notified by February 16, 2007, and their abstracts will be published in a book of abstracts. Sponsoring faculty will be invited to preside at their students' sessions.

Best Paper Awards
Papers on work being presented at the CURO Symposium submitted by March 19, 2007 will be considered for Best Paper awards in the categories of humanities, social sciences, civic responsibility focus, international focus, and sciences. Papers must be submitted electronically to curo@uga.edu. Maximum length is 20 pages, double spaced.

Purpose of the Symposium:
- To highlight excellence in research by undergraduate students
- To enrich the undergraduate experience by promoting communication and cooperation between faculty and students
- To provide a forum for undergraduates to communicate and disseminate their research findings and creative works
- To provide an opportunity for undergraduate researchers in the state of Georgia to engage with their peer researchers

Criteria for Selection:
- Originality and quality of research
- Quality of written abstract
- Ethical and responsible research
- Extent of the undergraduate student's involvement in development of the research design and execution of the project. Research presented at the Symposium should go beyond work completed for a class paper or project
- A letter of support from supervising faculty

This event will be free and open to the public. All interested faculty and students are encouraged to attend the CURO 2007 Symposium. For more information, contact curo@uga.edu, (706) 542-5871.

Monday, April 10th, 2006

Begin registration of oral and poster presenters; Students hang up posters — **9:00 a.m.**
Tate Student Center, Lower Lobby

Concurrent Oral Sessions — **10:10 a.m.**
Tate Student Center, Rooms 137, 138, 139, 140, 141

Performing Arts: Music — **11:15 a.m.**
Tate Student Center, Georgia Hall A

Concurrent Oral Sessions — **11:15 a.m.**
Tate Student Center, Rooms 137, 138, 139, 140, 141

Performing Arts: Creative Writing — **12:20 p.m.**
Tate Student Center, Georgia Hall A

Concurrent Oral Sessions — **12:20 p.m.**
Tate Student Center, Rooms 137, 138, 139, 140, 141

Performing Arts: Dance — **1:25 p.m.**
Tate Student Center, Georgia Hall A

Concurrent Oral Sessions — **1:25 p.m.**
Tate Student Center, Rooms 137, 138, 139, 140, 141

Performing Arts: Drama — **2:30 p.m.**
Tate Student Center, Georgia Hall A

Concurrent Oral Sessions — **2:30 p.m.**
Tate Student Center, Rooms 137, 138, 139, 140, 141

Welcome and Opening Session — **4:00 p.m.**
Tate Student Center, Georgia Hall A
Dr. David S. Williams
Director, Honors Program
Dr. David C. Lee
Vice President for Research

Introduction of Keynote Speaker
Ms. Melissa Cabinian
CURO Scholar and CURO Apprentice Program Alumna

Keynote Address: *"Polycentrism: Interdisciplinary Work in the Academy"*
Dr. Jace Weaver
Professor, Religion and Native American Studies
Director, Institute of Native American Studies

CURO National Science Foundation Promising Scholars and Outstanding STEM High School Teachers
Dr. David S. Williams
Director, Honors Program

Announcement of Excellence in Undergraduate Research Mentoring Awards
Dr. Arnett C. Mace
Sr. Vice President for Academic Affairs and Provost

Poster Session **5:00 p.m.**
Tate Student Center, Georgia Hall A & B

CURO Apprentice Dinner **6:45 p.m.**
Tate Student Center, Reception Hall

Art Gallery Talks **7:00 p.m.**
Student Learning Center, Fourth Floor Rotunda
Prof. Carmon Colangelo
Director, Lamar Dodd School of Art
Ms. Robin Dana
Gallery Director, Lamar Dodd School of Art

Dessert Reception & Announcement of CURO Scholars, CURO Summer Research Fellows, Best Poster, and Best Paper Awards **8:00 p.m.**
Dr. David S. Williams
Director, Honors Program
Student Learning Center, Fourth Floor Rotunda
Deborah Dietzler
Executive Director, UGA Alumni Association

Monday, April 10, 2006

Concurrent Oral Sessions
Tate Student Center Conference Rooms 137, 138, 139, 140, 141

10:10 - 11:00 a.m. First Concurrent Session

Room 137	**Jake Turrentine**	Trans-sialidase Specific $CD8^+$ T Cell Responses in T. cruzi Infection of Balb/C Mice
	Faculty Mentor	Dr. Rick Tarleton, Department of Cellular Biology
	Fei Yang	Regulation of Branched-chain Amino Acid Catabolism in Streptomyces coelicolor: Applications for Metabolic Engineering of Polyketide Antibiotic Biosynthesis
	Faculty Mentor	Dr. Janet Westpheling, Department of Genetics
Room 138	**Leigh E. Creighton**	Strategy and Intent Versus Function: A Comparative Study of the Moro Islamic Liberation Front and the Shining Path, Two Terrorist Groups
	Faculty Mentor	Dr. Stephen Shellman, Department of International Affairs
	Christine E. Tarleton	The Case for Increased Federal Funding of Embryonic Stem Cell Research
	Faculty Mentor	Dr. Steven Stice, Department of Animal and Dairy Science
	Lindsay Looft, Kevin Chang	Risk Management among Non-Clinical Healthcare Employees: The Key to Preserving Infrastructure in a Medical Emergency
	Faculty Mentor	Dr. Corrie Brown, Department of Pathology
Room 139	**Jana Dopson**	The Enigmatic Origins of the Bell Beaker Phenomenon
	Faculty Mentor	Dr. Ervan Garrison, Department of Anthropology and Department of Geology
	Elaine A. Augustine	New Light on an 18^{th}-Century Terracotta Sculpture: The Study for Sleeping Shepherd in the High Museum
	Faculty Mentor	Dr. Alisa Luxenberg, Department of Art History
	Laura C. Mackert	Migration of the Avant-garde in Early Modernist Visual Art: The Question of Sequence in Innovative Form and Ideology
	Faculty Mentor	Dr. David Roberts, Department of History
Room 140	**Grace A. Anglin**	The Influence of Gender on the Relationship Between Transplant Consequences and Health Outcome,
	Faculty Mentor	Dr. Ronald Blount, Department of Psychology

	Edmond Fomunung	The Effects of Cocaine on the Isolated Rabbit Heart and the Increased Cardiovascular Risk It Presents in the Presence of the Non-Selective Beta Blocker Propranolol
	Faculty Mentor	Dr. Benedict Lucchesi, Department of Pharmacology and Toxicology, University of Michigan Medical School
Room 141	**Russ Richardson**	The Effect of Land Use Strategies on the Functional Diversity of Neotropical Nematode Communities
	Faculty Mentor	Dr. Ronald Carroll, Institute of Ecology
	Brett M. Maley	Effect of Introduced Predator, the American Mink (*Mustela vison*) on Ground Nesting Songbirds in the Cape Horn Archipelago, Chile"
	Faculty Mentor	Dr. Amy Rosemond, Institute of Ecology
	Kelly Proctor	Differences in Environmental Reporting: China and the United States
	Faculty Mentor	Dr. Lee B. Becker, Director of Cox Center for International Mass Communication Training and Research

11:15 a.m. – 3:20 p.m. Performing Arts

Tate Student Center, Georgia Hall A

Danny Gough	Music
Faculty Mentor	Dr. Pamela B. Kleiber, Center for Undergraduate Research, University of Georgia
Shehzeen Choudhury	American Stranger
Faculty Mentor	Dr. Judith Ortiz Cofer, Department of English, University of Georgia
Betsy Jones	Creative Writing
Faculty Mentor	Dr. Phil Williams, Franklin College of Arts & Sciences, University of Georgia
Angela Still	Grandma Wobbly's Olde Fashioned Fudge Shoppe
Faculty Mentor	Dr. Judith Ortiz Cofer, Department of English, University of Georgia
Charlotte Foster	Being (Interpretations of Interpretations)
Faculty Mentor	Prof. Rebecca Enghauser, Department of Dance, University of Georgia
Joseph Hutto	Attention!Deficit-Hyperactivity:Disorder?
Faculty Mentor	Prof. Rebecca Enghauser, Department of Dance, University of Georgia

	Ezinne Okwandu	Carolina
	Faculty Mentor	Dr. Pamela B. Kleiber, Center for Undergraduate Research Opportunities, University of Georgia
	Lauri Short	Drama
	Faculty Mentor	Dr. David Saltz, Department of Theatre and Film Studies University of Georgia
	Megan Doyle	Drama
	Faculty Mentor	Dr. David Saltz, Department of Theatre and Film Studies University of Georgia
	Jamie Hyder	Drama
	Faculty Mentor	Dr. David Saltz, Department of Theatre and Film Studies University of Georgia
	Lauren Dykes	Rock, Paper, Scissors
	Faculty Mentor	Dr. David Saltz, Department of Theatre and Film Studies University of Georgia

11:15 a.m. – 12:05 p.m. Second Concurrent Session

Room 137	**Amy V. Chudgar**	Effects of Glycosaminoglycans and Pectins in Early Stages of Angiogenesis
	Faculty Mentor	Dr. Carl Bergmann, Complex Carbohydrate Research Center
	Anjali Shroff	Cloning, Expression, and Verification of Pyrococcus furiosus Protein, PF1476
	Faculty Mentor	Dr. Robert Scott, Department of Chemistry
	Matthew Haney	Antibody Depletion of Highly Abundant Proteins in Trypanosoma cruzi for Fine-tuning of Proteomic Analysis
	Faculty Mentor	Dr. Rick Tarleton, Department of Cellular Biology
Room 138	**Tyler B. Pratt**	Reforming the Kingdom: Educational, Economic, and Political Change in Saudi Arabia
	Faculty Mentor	Dr. Sherry Lowrance, Department of International Affairs
	Daniel J. Weitz	An Emerging International World Order: The Case for Mandatory Foreign Language Proficiency within the United States Public School System
	Faculty Mentor	Dr. Linda Harklau, Department of Language and Literacy Education
Room 139	**Courtney M. Thomas**	The Albany Movement: Black and White Perspectives in Albany, Georgia, 1961-62
	Faculty Mentor	Dr. Barbara McCaskill, Department of English

	Kathryn Otrosina	Forwarding the Agenda of the Right: The Intercollegiate Studies Institute's (ISI) Influence on Campus Student Newspapers
	Faculty Mentor	Dr. Kathleen deMarrais, Department of Elementary and Social Studies
	Sara E. Swart	Three Republican Archetypes Square Off in North Georgia
	Faculty Mentor	Dr. Charles Bullock, Department of Political Science
Room 140	**Jamarri J. Ivy**	Assessing Opinions of Georgia Residents on Poverty and Labor Markets in 2005
	Faculty Mentor	Dr. James Bason, Survey Research Center
	Victoria S. LeBeaux	Student Willingness to Pay to Avoid Unpleasant Odors on Campus
	Faculty Mentors	Dr. Jeff Mullen, Department of Agricultural and Applied Economics
	Michael J. Hotard	¿Para Risas?: The Relationship Between Sports and Gender in an Ecuadorian Fishing Village
	Faculty Mentor	Dr. Michael Harris, Department of Anthropology and Archaeology
Room 141	**Andrew Leidner**	The Evolution of Virulence in a Two Disease System
	Faculty Mentor	Dr. Pejman Rohani, Department of Ecology
	Melissa Cabinian	Antagonistic Effects of Naturally Occurring Altered Peptide Ligands on Trypanosoma cruzi-specific CD8 T Cell Response
	Faculty Mentor	Dr. Rick Tarleton, Department of Cellular Biology
	Alina Kuo	Identification of a New IS Element from Streptomyces Coelicolor
	Faculty Mentor	Dr. Janet Westpheling, Department of Genetics

12:20 – 1:10 p.m. Third Concurrent Session

Room 137	**Priya Chandan**	LHR Expression in Transfected Ovarian Cells
	Faculty Mentor	Dr. David Puett, Department of Biochemistry and Molecular Biology
	Kimberly Coveney	Role of Calcium Independent Phospholipase A2 (iPLA2) in Phospholipid Metabolism in Chemotherapeutic-induced Cancer Cell Death
	Faculty Mentor	Dr. Brian Cummings, Department of Pharmaceutical and Biomedical Sciences

	Chen Lin	Identifying GPI-anchored Proteins in Breast Cancer Cells
	Faculty Mentor	Dr. James Pierce, Complex Carbohydrate Research Center
Room 138	**William M. Draxler, Joshua R. Heard**	Containerized Shipping: A Gap in National Security
	Faculty Mentor	Dr. Michael Speckhard, Department of International Affairs
	Adam P. Williams	Reconstructing Maginot: Missile by Missile
	Faculty Mentor	Dr. James Holmes, Center for International Trade and Security
	Balaji L. Narain, Kate Bryant	Evolution of US Trade Policy: A Reconsideration of US Anti-Dumping Laws
	Faculty Mentor	Dr. James Holmes, Department of Economics
Room 139	**Alexander Watts**	Emotion, Identity, and Cardiovascular Response
	Faculty Mentor	Dr. Dawn Robinson, Department of Sociology
	Jessica Zabell, Sara Douglass, Crystal Barber	The Relationship between Children's Emotional Responses to Puppet Vignettes and their Social Competence
	Faculty Mentor	Dr. Tsu-Ming Chiang, Department of Psychology, Georgia College & State University
	Rebecca D. Trupe, Grace A. Anglin	Development of the AFFECT Module: A Family-Focused Emotion Communication Training (AFFECT) Module
	Faculty Mentor	Dr. Kimberly Shipman, University of Colorado Medical School
Room 140	**Natalie M. Jennings**	Hepatic Expression of Deiodinase-1 in the Rat
	Faculty Mentor	Dr. Duncan Ferguson, Department of Physiology and Pharmacology
	Anna Lee	Pulmonary Responses to Ozone in Obese Mice
	Faculty Mentor	Dr. Stephanie Shore, Department of Public Health, Harvard School of Public Health
	Rachel E. Whitaker	A Tangled Topic: The Connect Sum of Mathematical Knots
	Faculty Mentor	Dr. Jason Cantarella, Department of Mathematics
Room 141	**Barrett Jones**	Design of an Inducible System for Expression of the Human Luteinizing Hormone Receptor
	Faculty Mentor	Dr. Susanne Warrenfeltz, Department of Biochemistry and Molecular Biology

	Annie Tran	Analyzing the Effects of Pectin Degrading Enzymes and Their Inhibitors on the Neurological Development of Drosophila
	Faculty Mentor	Dr. Michael Tiemeyer, Department of Biochemistry and Molecular Biology Dr. Carl Bergmann, Complex Carbohydrate Research Center
	Katrin Usifo	Identification of Transcription Factors that Bind to WhiB3 Promoter in Mycobacterium Tuberculosis
	Faculty Mentor	Dr. Joel Ernst, Department of Microbiology, New York University Medical School

1:25 – 2:15 p.m. Fourth Concurrent Session

Room 137	**Kristen E. Habel**	The Creation of 16S rDNA Clone Libraries for the Identification of Bacteria in the Gut Microbial Flora of Drosophilia melanogaster
	Faculty Mentor	Dr. Larry Shimkets, Department of Microbiology
	Jodi L. Dyer	Phenotypical and Genotypical Antibiotic Resistance Analyses of Fecal Bacteria Isolates in Dairy Cattle
	Faculty Mentor	Dr. Susan Sanchez, Athens Diagnostic Lab, College of Veterinary Medicine
	Dan W. Thon	Development of a Trypsin Assay in a Permeabilized Cell System to Characterize the Luteinizing Hormone Receptor Induced Activation of G-Proteins
	Faculty Mentor	Dr. David Puett, Department of Biochemistry and Molecular Biology
Room 138	**Carey J. Kirk**	Healing Arts: The Use of Drama Therapy in Treating People Suffering from Trauma
	Faculty Mentor	Dr. David Saltz, Department of Drama and Theater
	John Crowe	AUX Launch: Art, Representation and Commerce on the Web
	Faculty Mentor	Prof. Mark Callahan, Institute for Creative Exploration
	Tom R. Ribitzky	ATB & The Angel of History: A Case Study of the Dialectic in Trance Music
	Faculty Mentor	Dr. Beatrice Hanssen, Department of Germanic and Slavic Languages
Room 139	**Ashley N. Beebe**	The Effects of Media on Economic Policy and Business Decisions in Brazil and Argentina
	Faculty Mentor	Dr. James Holmes, Center for International Trade and Security

	Allyson L. Barnes	Efficiency Evaluation of Cotton Production Practices using Stochastic Frontier Analysis
	Faculty Mentor	Dr. Timothy Park, Department of Agricultural and Applied Economics
	William M. Collier	Modeling the Effects of the North American Beaver (*Castor Canadensis*) on Sub-Antarctic Stream Food Webs in the Cape Horn Archipelago, Chile
	Faculty Mentor	Dr. Amy Rosemond, Institute of Ecology
Room 140	**Ian Lewis Campbell**	The Mythological Present
	Faculty Mentor	Dr. Glenn Wallis, Department of Religion
	Matthew R. Smith	Johnny Cash, Mythology, and the Possibilities of Experimental Historiography
	Faculty Mentor	Dr. Steven Soper, Department of History
	Radhika Prabhakar	The Interaction of Geography and Identity in Ruth Klüger's *Still Alive*
	Faculty Mentor	Dr. Martin Kagel, Department of Germanic and Slavic Languages
Room 141	**Deep Shah**	Changes in the Synaptology of Corticostriatal and Thalamostriatal Innervation in the MPTP-treated Monkey Model of Parkinson's Disease
	Faculty Mentor	Dr. Yoland Smith, Division of Neuroscience, Yerkes National Primate Research Center
	Rouhin Sen	Determining What Causes Certain Carbohydrates to be Expressed in Certain Cells
	Faculty Mentor	Dr. Michael Tiemeyer, Department of Biochemistry and Molecular Biology
	Patrick R. Lingo	A Conserved Neural Signaling Pathway Regulates Hunger -induced Stress Tolerance in Drosophila
	Faculty Mentor	Dr. Ping Shen, Department of Cellular Biology

2:30 – 3:20 p.m. Fifth Concurrent Session

Room 137	**Liron Bar-Peled**	A Novel Pathway for Polysaccharide Precursor Synthesis
	Faculty Mentor	Dr. Maor Bar-Peled, Department of Plant Biology
	Deep Shah, Paul Ruddle	Integrating Computational and Experimental Analysis to Study Transposable Elements (TEs) in Medicago truncatula
	Faculty Mentor	Dr. Susan Wessler, Department of Plant Biology

	Mason Y. Savage	Sequence Polymorphisms in the Mismatch-repair (TcMSH2) and Glutathione-S-transferase (Tc52) Genes of Trypanosoma cruzi Isolates from the United States
	Faculty Mentor	Dr. Michael Yabsley, Wildlife Disease Study
Room 138	**Mary Gassama**	Puppet Regimes
	Faculty Mentor	Dr. Stephen Shellman, Department of International Affairs
	Betsy A. Beasley	Striking the War Machine: The Anti-War Folklore of American Civilians and GIs during the Vietnam War
	Faculty Mentor	Dr. Elissa Henken, Department of English
	Michael W. Davis	Theory and National Identity: Yugoslavia in the Late 1940s and 1950s
	Faculty Mentor	Dr. Keith Langston, Department of Germanic and Slavic Languages
Room 139	**Arthur H. Shockley**	An Exemplary Being: The Prostitute in the Early Plays of Bertolt Brecht
	Faculty Mentor	Dr. Martin Kagel, Department of Germanic and Slavic Languages
	Alicia Higginbotham	Homer's Voice Recalled: Christopher Logue's *Iliad* Accounts
	Faculty Mentor	Dr. Thomas Cerbu, Department of Comparative Literature
	Laura B. Kearns	**"**Fracturing Fairy Tales": Lu Xun's Old Tales Retold Reveal Power in Ancient Chinese Mythology
	Faculty Mentor	Dr. Kam-Ming Wong, Department of Comparative Literature
Room 140	**Sarah M. Yagoda**	Effects of Market System Entry on Rural Indigenous Women in Ecuador
	Faculty Mentor	Dr. Jose Alvarez, Department of Romance Languages
	Balaji L. Narain	The Employment of Fiscal Policy as the Primary Means of Controlling Inflation and Promoting Short-Term Stabilization, with Focus on the 1980s and 1990s in the United States
	Faculty Mentor	Dr. Harrison Hartman, Department of Economics
	Brian L. Levy	Family Involvement in Education: Is There a Magic Bullet?
	Faculty Mentor	Dr. Larry Nackerud, School of Social Work
Room 141	**Amy E. Trice**	Testing the River Continuum Concept in Sub-Antarctic Streams
	Faculty Mentor	Dr. Amy Rosemond, Institute of Ecology

Richard W. Dewey	Prediction of Maximum and Minimum Air Temperature of a 24-Hour Period with Artificial Neural Networks
Faculty Mentors	Dr. Ronald McClendon, Department of Biological and Agricultural Engineering
Erika Porter	NADH/Flavoprotein Imaging of the Zebrafish Lateral Line System
Faculty Mentor	Dr. Charles Keith, Department of Cellular Biology

4:00 p.m. Welcome and Opening Session

Tate Student Center, Georgia Hall A

Introductions and Welcome	Dr. David S. Williams, Director, Honors Program Dr. David C. Lee, Vice President for Research
Introduction of Dr. Weaver	Melissa Cabinian, CURO Apprentice Program Alumna and CURO Scholar
Keynote Address ***Polycentrism: Interdisciplinary Work in the Academy***	Dr. Jace Weaver Professor, Religion and Native American Studies Director, Institute of Native American Studies
CURO National Science Foundation Promising Scholars and Outstanding STEM High School Teachers	Dr. David S. Williams, Director, Honors Program
Excellence in Undergraduate Research Mentoring Awards	Dr. Arnett C. Mace, Senior Vice President for Academic Affairs and Provost

5:00 p.m. Poster Presentations

Tate Student Center, Georgia Hall

Laura Beth Agnew	An Immunohistochemical Study to Investigate the Potential Role of Intercellular Adhesion Molecule-1 (ICAM-1) and Fractalkine in Placental Malaria
Faculty Mentor	Dr. Julie Moore, Department of Infectious Diseases
Laura M. Aikens	Capital Punishment: A Closer Look
Faculty Mentor	Dr. Dean Rojek, Department of Sociology
Allyson L. Barnes	Efficiency Evaluation of Cotton Production Practices using Stochastic Frontier Analysis
Faculty Mentor	Dr. Timothy Park, Department of Agricultural and Applied Economics

Ingrid Bloom	Differentiation of Human Embryonic Stem Cells into Endothelial Progenitors
Faculty Mentor	Dr. Steven Stice, Department of Animal and Dairy Science
Sarah Breevoort	Construction of Three Rce1p Mutant Plasmids to Aid in the Characterization of Rce1p Enzymatic Activity
Faculty Mentor	Dr. Walter Schmidt, Department of Biochemistry & Molecular Biology
Peter Caruana	Characterization of IS492 insertion at the *eps* locus of Pseudoalteromonas *atlantica*
Faculty Mentor	Dr. Anna Karls, Department of Microbiology
Anureet J. Cheema	Glycomics and Glycoproteomics on Complex Glycoprotein Mixtures: Optimization of Separation Methods for Glycopeptide and Oligosaccharide Analysis
Faculty Mentor	Dr. Michael Pierce, Department of Biochemistry and Molecular Biology
Nathan Crain	Understanding Cellular Immortality: Telomere Functioning in Yeast
Faculty Mentor	Dr. Michael McEachern, Department of Genetics
Amy Chudgar	Effects of Glycosaminoglycans and Pectins in Early Stages of Angiogenesis
Faculty Mentor	Dr. Carl Bergmann, Complex Carbohydrate Research Center
Sita M. Damaraju	The Effect of Polymer Scaffolds with Nanopillar Structures Fabricated Using Solvent Leaching/Gas Forming Method on Long Term Osteoblast Response
Faculty Mentor	Dr. William Kisaalita, Department of Biological and Agricultural Engineering
Jodi L. Dyer	Phenotypical and Genotypical Antibiotic Resistance Analyses of Fecal Bacteria Isolates in Dairy Cattle
Faculty Mentor	Dr. Susan Sanchez, Athens Diagnostic Lab, College of Veterinary Medicine
Laura Frame	The Effect of Aedes aegypti Larval Nutrition on Metamorphosis
Faculty Mentors	Dr. Aparna Telang, Department of Entomology Dr. Mark Brown, Department of Entomology
Sana F. Hashmi	O-glycans and Congenital Muscular Dystrophy
Faculty Mentor	Dr. Lance Wells, Department of Biochemistry and Molecular Biology
Ned W. Hembree	Synthesis of Dipeptidyl Acyloxymethyl Ketones (AOMK) Inhibitors of Yeast Enzymes Rce1p and Ste24p
Faculty Mentor	Dr. Timothy Dore, Department of Chemistry

Maggie M. Hodges	Isolation and Characterization of a Novel Heterotrophic Anaerobic Thermophile from the Uzon Caldera (Kamchatka, Russia)
Faculty Mentor	Dr. Paul Schroeder, Department of Geology
Staci R. Hutsell	Matrigel Invasion Assay for Ovarian Cancer Cell Lines
Faculty Mentor	Dr. David Puett, Department of Biochemistry and Molecular Biology
Natalie M. Jennings	Hepatic Expression of Deiodinase-1 in the Rat
Faculty Mentor	Dr. Corrie Brown, Department of Pathology
Lisa Jordan	The Role of Sympathetic Nerves in Leptin-induced Loss of Body Fat
Faculty Mentor	Dr. Ruth Harris, Department of Food & Nutrition
Blake L. Joyce	Tangerine Blush: Engineering Soybean to Produce β-carotene in Seed Cotyledons
Faculty Mentor	Dr. Wayne Parrott, Department of Crop and Soil Sciences
Simon Kahsay	Development of a Diagnostic Test for Mycobacterium avium
Faculty Mentor	Dr. Russell Karls, Department of Infectious Diseases
Jayne M. Kelly	The Effects of Social Experience on Aggressive Behavior in Drosophila
Faculty Mentor	Dr. Yong-Kyu Kim, Department of Genetics
Allison Koch	Systems Biology of the Quinic Acid Cluster in Neurospora crassa
Faculty Mentor	Dr. Jonathan Arnold, Department of Genetics
Sonika Kushwaha, Sarah Reagin	Striking A Balance: How Young Children Hammer
Faculty Mentors	Dr. Dorothy Fragaszy, Department of Psychology Dr. Kathy Simpson, Department of Kinesiology
Lindsay Looft	Permethylation of 2-Aminopyridine Labeled Oligosaccharides: Facilitating the Analysis of Complex Glycan Mixtures
Faculty Mentor	Dr. Michael Pierce, Department of Biochemistry & Molecular Biology
Jon McGough	Female Choice in Sexual Selection in Drosophila pseudoobscura
Faculty Mentor	Dr. Wyatt Anderson, Department of Genetics
Tatyanna Nienow	Adapting Yeast for the Study of Pitrilysin and other M16A Enzymes
Faculty Mentor	Dr. Walter Schmidt, Department of Biochemistry and Molecular Biology
Carmel L. Norman	Effects of a Boring Lichen on Shell Strength of the Marsh Periwinkle Snail Littoraria irrorata
Faculty Mentor	Dr. David Porter, Department of Plant Biology

Ezinne A Okwandu	Development of Real-time PCR to Measure mRNA Expression of Stress Peptides in Specific Brain Nuclei of Rats
Faculty Mentor	Dr. Ruth Harris, Department of Food and Nutrition
Travis M. Palmer	Construction & Expression of Fusion Protein yHCG1 & LHR ECD & ECLs for Expression in Insect Cells
Faculty Mentor	Dr. David Puett, Department of Biochemistry and Molecular Biology
Kurinji Pandiyan	The Genomic Instability of Human Embryonic Stem Cells
Faculty Mentor	Dr. Steve Stice, Department of Animal and Dairy Science
Marlena L. Pinchon	Activation of Innate Immune Response by Wild-type and Attenuated Rabies Virus
Faculty Mentor	Dr. Zhen Fu, Department of Pathology
Patrick G. Pilie	Morphogenesis of the Rat Cerebellum
Faculty Mentor	Dr. Alexandra Joyner, Skirball Institute, New York University School of Medicine
Sarah B. Puryear	Detection of Babesia microti in Human Tissue through In Situ Hybridization
Faculty Mentor	Dr. Corrie Brown, Department of Pathology
Eva B. Reed	Effect of Trait Anxiety on Explicit Memory for Positive and Negative Words Presented Under Divided and Restricted Attention
Faculty Mentor	Dr. Richard Marsh, Department of Psychology
Russ Richardson	The Effect of Land Use Strategies on the Functional Diversity of Neotropical Nematode Communities
Faculty Mentor	Dr. Ronald Carroll, Institute of Ecology
Rebecca L. Satterfield	Analysis of Mycobacterium shottsii Pathogenesis Using Zebrafish as a Model System
Faculty Mentor	Dr. Russell Karls, Department of Infectious Diseases
Deep Shah	Integrating Computational and Experimental Analysis to Study Transposable Elements (TEs) in *Medicago truncatula*
Faculty Mentor	Dr. Susan Wessler, Department of Plant Biology
Deep Shah	Changes in the synaptology of corticostriatal and thalamostriatal innervation in the MPTP-treated monkey model of Parkinson's Disease
Faculty Mentor	Dr. Yoland Smith, Division of Neuroscience, Yerkes National Primate Research Center, Emory University

Christina M. Swaney	The Expression and Purification of Cysteine Dioxygenase and Cysteine Sulinicacid Decarbonoxylase, the Enzymes Constituting the Pathway for Taurine Biosynthesis in Humans
Faculty Mentor	Dr. William Lanzilotta, Department of Biochemistry and Molecular Biology
Elizabeth C. Theriault, Jordan Bray	Molecular Epidemiology of Salmonella enterica Typhimurium on Poultry and Dairy Farms in Georgia
Faculty Mentor	Dr. John Maurer, Department of Poultry Science
Courtney M. Thomas	The Albany Movement: Black and White Perspectives in Albany, Georgia, 1961-62
Faculty Mentor	Dr. Barbara McCaskill, Department of English
Jenna L. Thomason	NIRS Detection of Brain Activity During Low Intensity Exercise
Faculty Mentor	Dr. Kevin McCully, Department of Kinesiology
Annie Tran	Analyzing the Effects of Pectin Degrading Enzymes and Their Inhibitors on the Neurological Development of Drosophila
Faculty Mentors	Dr. Michael Tiemeyer, Department of Biochemistry and Molecular Biology Dr. Carl Bergmann, Complex Carbohydrate Research Center
Christy M. Turner	Effects of Nitrate Contamination on Leaf Breakdown in a Stream at the State Botanical Garden of Georgia
Faculty Mentor	Dr. Sue Eggert, Department of Entomology
Daniel J. Weitz	An Emerging International World Order: The Case for Mandatory Foreign Language Proficiency within the United States Public School System
Faculty Mentor	Dr. Linda Harklau, Department of Language and Literacy Education
Cary F. West, Danielle Morozewicz	Improving Ultrasound Arterial Assessment by Standardizing Probe Selection and Optimization Settings
Faculty Mentor	Dr. Kevin McCully, Department of Kinesiology
Dustin Williams	Development of Transgenic Zebrafish to Understand the Role of Hyal-2 in Tumor Formation
Faculty Mentor	Dr. Scott Dougan, Department of Cellular Biology
Jennifer S. Wilson	Beta-amyloid Immunoglobins as a Potential Early Marker for Alzheimer's Disease
Faculty Mentor	Dr. L. Stephen Miller, Department of Psychology

James M. Wheeler	Analysis of Interactions Between EPGs/PGIPs/Pectins Using Surface Plasmon Resonance
Faculty Mentor	Dr. Carl Bergmann, Complex Carbohydrate Research Center
Charles Wooten	Genetic Manipulation of *Actinosynnema pretiosum*
Faculty Mentor	Dr. Janet Westpheling, Department of Genetics
Lanelle Wright	Identifying IS492 Chromosomal Insertions in Escherichia coli
Faculty Mentor	Dr. Anna Karls, Department of Microbiology
Stephanie Yarnell	Unraveling the Molecular Basis of the Role of Pectins in Human Health
Faculty Mentor	Dr. Carl Bergmann, Complex Carbohydrate Research Center

7:00 p.m. Art Gallery Talks

Student Learning Center, Fourth Floor Rotunda

Introductions	Prof. Carmon Colangelo, Director, Lamar Dodd School of Art Ms. Robin Dana, Gallery Director, Lamar Dodd School of Art

Visual Arts Presenters

Allison Banks	Photography
Faculty Mentor	Professor Michael Marshall, Department of Photography, University of Georgia Professor Stephen Scheer, Department of Photography, University of Georgia
Cameron Dye	Printmaking
Faculty Mentor	Professor Joe Sanders, Department of Printmaking, University of Georgia
Alexis Gregg	Ceramics
Faculty Mentor	Professor Ted Saupe, Department of Ceramics, University of Georgia
Courtney Reece	Scientific Illustration
Faculty Mentor	Professor Gene Wright, Department of Scientific Illustration, University of Georgia
Samuel Stabler	Drawing and Painting
Faculty Mentor	Professor Joseph Norman, Department of Drawing and Painting, University of Georgia
Jennifer Xin	Graphic Design
Faculty Mentor	Professor Lanny Webb, Department of Graphic Design, University of Georgia

Art exhibit arranged by Ms. Robin Dana, Gallery Director, Lamar Dodd School of Art

8:00 p.m. Dessert Reception and Awards Ceremony

Student Learning Center, Fourth Floor Rotunda

Presentation of CURO Summer Research Fellowships, CURO Scholars, Best Poster, and Best Paper Awards	Dr. David S. Williams, Director, Honors Program Deborah Dietzler, Executive Director, UGA Alumni Association

The office of the Senior Vice President for Academic Affairs and Provost and the Honors Program established the Excellence in Undergraduate Research Mentoring Award in 2001. This award recognizes faculty, departments, and programs devoted to outstanding research mentorship of undergraduate students. This year the Graduate School and the Honors Program have established a new award that recognizes graduate students devoted to the research mentorship of undergraduate students. Awards will be presented at the CURO Symposium Awards Ceremony on Monday, April 10, 2006 at 4:00 p.m. in the Tate Student Center, Georgia Hall.

2006 Awards

Master Level Faculty Award
Dr. Patricia Hunt-Hurst, Associate Professor of Textiles, Merchandising, and Interiors

Early Career Faculty Award
Dr. Rodney Mauricio, Professor of Genetics

Graduate Student Award
Christopher Anderson, PhD candidate in Ecology

Graduate Student Recognition
Dawn Holligan, PhD student in Plant Biology

2005 Awards

Faculty Awards
Dr. Gary Barrett, Odum Professor of Ecology
Dr. Sidney Kushner, Professor of Genetics

Department Award
Department of Cellular Biology.

2004 Award

Faculty Award
Dr. William S. Kisaalita, Associate Professor, Dept. of Biological & Agricultural Engineering

2003 Awards

Faculty Award
Dr. Jody Clay-Warner, Assistant Professor of Sociology

Department Award
Department of Microbiology
Dr. Duncan Krause, Department Head
Dr. Tim Hoover, Undergraduate Coordinator

Program Award
The Pratt Laboratory of Plant Genomics and Bioinformatics
Dr. Lee H. Pratt, Professor
Dr. Marie-Michèle Cordonnier-Pratt, Senior Research Scientist

2002 Awards

Faculty Awards
Professor William D. Paul, Jr., Professor of Art
Dr. Katherine Kipp, Associate Professor of Psychology

Faculty Recognition
Dr. Susan Sanchez, Assistant Professor of Veterinary Medicine

Department Award
Department of Biochemistry and Molecular Biology
Dr. J. David Puett, Department Head

Program Award
"Physics Beyond the Boundaries": National Science Foundation, REU Program
Dr. Loris Magnani, Principal Investigator, Professor of Physics and Astronomy
Dr. Heinz-Bernd Schuttler, Professor and Department Head of Physics and Astronomy
Dr. Jonathan Arnold, Professor of Genetics
Dr. Susmita Datta, Professor, Georgia State University
Dr. David Logan, Professor, Clark Atlanta University
Dr. William Steffans, Professor, Clark Atlanta University

2001 Awards

Faculty Award
Dr. Marcus Fechheimer, Professor of Cellular Biology

Faculty Recognition
Dr. David MacIntosh, Associate Professor of Environmental Health Sciences
Dr. Dean Rojek, Associate Professor of Sociology

Department Award
Genetics Department
Dr. John MacDonald, Department Head and Professor

Program Award
Savannah River Ecology Laboratory
Dr. Paul Bertsch, Director

Graduate Student Reviewers for CURO 2006 Symposium

Cady Berkel	Child and Family Development
Sarah Cooley	Marine Sciences
Sarah Craven	Microbiology
Patrick Curtis	Microbiology
John M. Davis	Ecology
Emily DeCrescenzo Henriksen	Microbiology
Geneva DeMars	Biochemistry and Molecular Biology
Anita DeRouen	English
George Felis	Philosophy
Joy Harden	Counseling Psychology
Jeff Lake	Plant Biology
Rebecca Nordin	Educational Psychology
Greta Polites	Management Information Systems
Chip Small	Ecology
Sara Steger	English
Jeff Stoike	Ecology
James Tucker Swindell II	Biochemistry
Meghan VanDeventer	Educational Psychology
Sarah Vess	Educational Psychology

Reviewers for Best Paper Awards

Faculty

Dr. Ronald Carroll	Ecology
Dr. Jody Clay-Warner	Sociology
Dr. Roxanne Eberle	English
Dr. William P. Flatt	Foods and Nutrition (Emeritus)
Dr. Richard K. Hill	Chemistry (Emeritus)
Dr. Sylvia M. Hutchinson	Center for Teaching and Learning (Emerita)
Dr. Sidney Kushner	Genetics
Dr. William Lanzilotta	Biochemistry and Molecular Biology
Dr. Kevin McCully	Kinesiology
Dr. Carolyn Medine	Religion, Institute for Women's Studies, Institute for African American Studies
Dr. Leara Rhodes	Journalism
Dr. Paul Sutter	History
Dr. Kalpen D. Trivedi	English
Dr. Lance Wells	Biochemistry and Molecular Biology

Graduate Students

Cady Berkel	Child and Family Development
Jeff Lake	Plant Biology
Greta Polites	Management Information Systems
James Tucker Swindell II	Biochemistry

Reviewers for CURO Summer Research Fellowships

Dr. Wyatt Anderson	Professor, Genetics
Dr. William Barstow	Department Head and Professor, Biological Sciences
Dr. Karen Bauer	Director, Office of Institutional Research Adjunct Associate Professor, Institute of Higher Education
Dr. Roxanne Eberle	Associate Professor and Undergraduate Coordinator, English
Dr. Leara Rhodes	Associate Professor, Journalism
Dr. Scott Shaw	Professor, Physics and Astronomy
Dr. Regina Smith	Associate Vice President for Research
Dr. Katharina Wilson	Professor, Comparative Literature

CURO Advisory Board

Dr. E. M. Beck	Professor, Sociology
Dr. Gary Bertsch	Director and University Professor, Center for International Trade and Security
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Dr. Stuart Feldman	Director and Professor, Interdisciplinary Toxicology Program
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Dr. Maureen Grasso	Dean, Graduate School
Dr. David Lee	Vice President for Research and Associate Provost
Prof. Jere Morehead	Vice Provost for Academic Affairs
Dr. J. David Puett	Department Head and Regents Professor, Biochemistry and Molecular Biology
Dr. Fausto Sarmiento	Assistant Professor, Geography
Dr. Steven Stice	Senior Research Scientist and Associate Professor, Animal and Dairy Science
Dr. Katharina Wilson	Professor, Comparative Literature
Melissa Cabinian	Undergraduate Student
Melvin Hines, Jr.	Undergraduate Student
Douglas Jackson	Undergraduate Student

Ex Officio

Dr. David S. Williams	Director of the Honors Program, Foundation Fellows, and CURO
Dr. Pamela B. Kleiber	Associate Director of the Honors Program and CURO

CURO Gateway Seminar Faculty

Professor Mark Callahan	Ideas for Creative Expression (ICE)
Dr. Ron Carroll	Ecology
Dr. Kathleen DeMarrais	Social Science Education
Dr. Joseph Dominick, Jr.	Journalism
Dr. William Eiland	Art History
Dr. Marcus Fechheimer	Cellular Biology
Dr. Katarzyna Jerzak	Comparative Literature
Dr. Pamela B. Kleiber	Honors Program and CURO
Dr. Elizabeth Kraft	English
Dr. Marc L. Lipson	International Business
Dr. Tricia Lootens	English
Dr. Larry Nackerud	Social Work
Dr. Jeffry Netter	Banking and Finance
Dr. Rosemary Phelps	Counseling Psychology and Human Services
Dr. David Porter	Botany
Dr. Dean Rojek	Sociology
Dr. Paul Schroeder	Geology
Dr. Scott Shamp	Telecommunications
Dr. Stephen Shellman	International Affairs
Dr. Michael Terns	Biochemistry and Molecular Biology
Dr. Kecia Thomas	Psychology
Dr. Katharina Wilson	Comparative Literature

Karen A. Holbrook Academic Support Award Recipients

2006 Award

Jody L. Dyer	
Faculty Mentor	Dr. Susan Sanchez, Athens Diagnostic Lab, College of Veterinary Medicine

2005 Award

Josef Broder	*Multivariate Harmonic Analysis*
Faculty Mentor	Dr. Andrew Sornborger, Department of Mathematics

2004 Award

Steven Jocoy	
Faculty Mentor	Dr. Michael Bender, Department of Genetics

An Immunohistochemical Study to Investigate the Potential Role of Intercellular Adhesion Molecule-1 (ICAM-1) and Fractalkine in Placental Malaria

Laura Beth Agnew
Dr. Julie Moore, Department of Infectious Diseases, University of Georgia

Placental malaria can cause premature deliveries, low birth weight babies, and maternal anemia, and it is an important public health concern in areas where malaria transmission is endemic. During human placental malaria, Plasmodium falciparum-infected red blood cells (iRBC) are harbored in the intervillous spaces of the placenta, and this sequestration leads to a higher concentration of malaria parasites than is found in the periphery of the body. Recent studies have investigated the interaction between iRBCs and the syncytiotrophoblast (ST) membrane, and it is believed that the consequences of their interaction may better explain the phenomenon of placental malaria. The purpose of this study is to compare the immunohistochemical staining of infected and normal placental tissue sections to determine if infection has an effect on the concentration or localization of two immunological molecules, intercellular adhesion molecule-1 (ICAM-1) and fractalkine. This experiment uses the Avidin Biotinylated enzyme Complex (ABC) staining method to visualize the location and intensity of both molecules following incubation with primary antibody, biotinylated secondary antibody, ABC, and enzyme substrate. Previous studies have suggested that both ICAM-1 and fractalkine might play important roles in the immunology of placental malaria by aiding in the sequestration of iRBCs in the intervillous spaces of the placenta, and both molecules are expressed by the ST. If more intense staining of these molecules is seen in placental tissues infected with malaria and if the staining is localized to areas such as the ST and intervillous spaces of the placenta, then this study would suggest that ICAM-1 and fractalkine are key immunological compounds in placental malaria and that one or both might be yet another reason for the higher concentration of iRBCs seen in placental tissues.

Capital Punishment: A Closer Look

Laura M. Aikens
Dr. Dean Rojek, Department of Sociology, University of Georgia

Capital punishment is an issue of great contention. The deterrence doctrine predicts that as the harshness of the punishment increases, the likelihood a person will commit a crime decreases. It also requires that the punishment swiftly follow the act to be effective. It would follow from this theory that capital punishment is the most effective way of deterring crime. However, even proponents of the deterrence doctrine do not believe that capital punishment can be applied to murderers. The perpetrators are usually under the influence of alcohol or drugs and therefore not in a rationally thinking state of mind. For deterrence to work, people must be rational. Other than the fact that capital punishment has no effect on crime rates, there are many other problems with the death penalty. There is an incredible amount of money and time that must be put forth in a death penalty case. The recent advent of DNA analysis has helped to prove several individuals' innocence, individuals who were sitting on death row. Some wonder if capital punishment constitutes "cruel and unusual" punishment because of the frequency of botched executions. Many countries disapprove of our use of the death penalty, and recent pressure from them has influenced some of our policies regarding it. A final issue many antagonists of capital punishment put forth is that it has become a form of vengeance, something which is not the responsibility of our justice system.

Development of the AFFECT Module: A Family-Focused Emotion Communication Training (AFFECT) Module

Grace A. Anglin – CURO SUMMER FELLOW, CURO APPRENTICE & Rebecca D. Trupe – CURO SUMMER FELLOW
Dr. Kimberly Shipman, University of Colorado Medical School

Our research focused on developing an intervention program called A Family Focused Emotion Communication Training Module

(AFFECT) aimed at teaching caregivers how to effectively communicate with their children about emotional experiences. Emotional management skills, normally learned from the primary caregiver, are important for the psychosocial adjustment of the child. Emotional management skills include the child's ability to recognize their emotions and the emotions of others, to understand the causes and consequences of emotion, and to modify and regulate their emotions. Children developing within "at risk" contexts, such as physical maltreatment, generally have less developed emotional management skills and display increased emotional and behavioral problems. Our research helped develop an intervention program aimed at teaching caregivers to effectively manage their own emotions and communicate with their children about emotions. In developing the intervention, we adapted techniques from dialectical behavior therapy for teaching emotion regulation skills, as well as designed supplemental handouts, worksheets, and homework activities for parents to reinforce the components of the program. In addition, we created a behavioral coding system that will be used to test the effectiveness of the intervention program at teaching emotion-focused communication skills (e.g., active listening skills, emotion coaching skills, emotion support skills). The AFFECT Module is still in development and has not yet been clinically tested using the coding system. However, we intend to use the coding system in future pilot studies to evaluate the AFFECT Module so it can be applied as an intervention for maltreating parents.

The Influence of Gender on the Relationship between Transplant Consequences and Health Outcome

Grace A. Anglin – CURO APPRENTICE
Dr. Ronald Blount, Department of Psychology, University of Georgia

Pediatric transplantation, formerly considered a last option for terminally ill children, has become the treatment of choice for a number of serious medical conditions. Life-saving organ transplantation is not a "cure," but rather, a transition from a chronic, life-threatening disease to a second chronic condition that requires living with and caring for a transplanted organ. To prevent organ rejection, a patient must take immunosuppressant medication daily for life. Patients follow, or adhere to, their prescribed medication regimen to varying degrees, with adolescent transplant patients often less medically adherent than other age groups. As a result, they are at increased risk for organ rejection. Unwanted side effects of necessary transplant medications which include excessive hair growth, weight gain, and limited athletic ability often create psychological barriers to proper adherence. What is unknown is how transplant consequences differentially affect adolescent male and female recipients. Interviews were completed with pediatric solid organ transplant recipients (ages 11-18) and their parents to determine how gender influences the relationship between transplant consequences and health outcome (e.g., quality of life, medication adherence). Interview questions assessed physical side effects, functional impairments, and quality of life. Medical adherence was based on patient and parent report, prescription drug refill records, and immunosuppressant drug levels. The results of this study will be used in the development of intervention programs to target the unique challenges of male and female adolescent transplant recipients.

New Light on an 18th-Century Terracotta Sculpture: The Study for Sleeping Shepherd in the High Museum

Elaine A. Augustine
Dr. Alisa Luxenberg, Department of Art History, University of Georgia

Works of art that are neither signed nor dated produce research opportunities for art historians to assign authorship as well as determine the year(s) in which they were completed. Study for Sleeping Shepherd is a small terracotta sculpture in the High Museum of Art in Atlanta. Art historians have attributed the work to Louis-Claude Vassé as the study for Sleeping Shepherd (marble, 1751), his reception piece into the French royal art academy and dated it circa

1740-1745. However, that dating can be challenged through visual comparisons, exhibition records, and biography. In addition, the material of this work—fired clay—affects any interpretation of its function and stylistic qualities. While terracotta was traditionally used to create preparatory works of art and not given a careful finish, it was also becoming, by the 1730s, desired by French art collectors who appreciated its surface qualities. My contribution to the study of this sculpture is to compare it with the finished marble reception piece Sleeping Shepherd as well as with ancient statues and contemporary sculptures by other French artists. These comparisons aid in determining a more precise date in which the High's terracotta may have been executed. I will also explore the motivation for and meaning of depicting a sleeping nude shepherd in relation to the classical revival in 18th-century French art. Research into contemporary criticism of Vassé's art and the provenance of this terracotta may help us to understand how some of his contemporaries perceived his art.

Photography
Allison Banks
Prof. Michael Marshall & Prof. Stephen Scheer, Department of Photography, University of Georgia

I have always believed in the importance of awareness of places, both large and small, and of our interpretations of them, our memories and imagined histories of them. When I began making photographs, it was very much an exercise in thinking about how I grew up, and where I came from. The photographs were my interpretation, my applied meaning, and my dream of a world. Since then, I have continued to broaden the terms of my history, becoming aware of the greater context in which I am situated.

My interest in the idea of The Neighborhood has grown, and I have begun exploring the ways in which we dress our yards, prune our shrubs, walk our dogs, park our cars, and feed our birds. I concentrate my vision on what is small, not entire yards, and thus each photographed object becomes a symbol of itself, encouraging us to consider new ideas about its meaning. In this way, I hope to more broadly define what it means to own a piece of land, to care for it, and decorate it. My photographs are quiet, personal, and about a certain way of seeing and arranging photographic space. I hope for them to be not only about how things look, but also about how we look at things and how it is possible that by slowing down and reflecting on what may initially seem small or inconsequential, we may come to recognize something more in our lives.

Efficiency Evaluation of Cotton Production Practices using Stochastic Frontier Analysis
Allyson L. Barnes
Dr. Timothy Park, Department of Agricultural and Applied Economics, University of Georgia

The overall objective of the study is to evaluate different technologies and cultural practices used in the production of upland cotton in South Georgia using stochastic frontier analysis. Stochastic frontier analysis recognizes that for a given level of inputs, producers can attain a maximum output, which is identified as the production frontier. Other producers may experience random shocks such as adverse weather, pest infestations, constraints on soil quality, along with limitations on managerial skill, resulting in output that lies below the frontier. Efficiency scores summarize how far below the frontier producers are operating. A stochastic frontier analysis is estimated in a statistical model to identify the key factors that influence the technical efficiency and cost

efficiency of cotton producers. Survey information from South Georgia cotton producers was gathered including combinations of tillage techniques and adoption of cotton transgenic technology along with the input, cost, and yield data on a field level. We include data on the tillage method used by the farmer (conventional tillage and strip tillage) along with five types of cotton, including conventional and transgenic varieties which have a built-in resistance to specific pests such as the cotton bollworm and the tobacco budworm. The efficiency model demonstrated that production methods using transgenic cotton varieties resulted in greater net returns and efficiency rankings than conventional cotton. Net returns and efficiency rankings were highest with conservation tillage. The research results will stress the advantages of the stochastic frontier approach for evaluating efficiency effects in crop production and outline additional applications of the technique for extension advisors assisting Georgia crop producers.

A Novel Pathway for Polysaccharide Precursor Synthesis

Liron Bar-Peled
Dr. Maor Bar-Peled, Department of Plant Biology, University of Georgia

Polysaccharides are the most abundant class of molecules in nature. They have numerous functions such as structural support (cellulose in plant cell walls), storage (starch), cell-to-cell communication (glycoproteins and glycolipids), protein trafficking and protein folding. Polysaccharides are synthesized from activated sugar-moieties known as nucleotide sugars. We are trying to address the different pathways by which these precursors are synthesized. One route by which nucleotide sugars are made involves a family of enzymes known as nucleotide sugar pyrophosphoyrlases (PPase) which convert a nucleotide (NTP) and sugar-1-phosphate to a nucleoside diphosphate (NDP)-Sugar and inorganic pyrophosphate. PPases are very specific enzymes and convert only one type of sugar-1-phosphate and nucleotide to respective nucleotide sugar. We have identified a gene in *Arabidopsis thaliana* that encodes a protein that shares 29% amino acid sequence identity to the well-characterized uridine diphosphate (UDP)-Glucose PPase. The recombinant gene was over-expressed in *Escherichia coli*, and the protein was purified via affinity chromatography. A series of assays were conducted varying the type of nucleotide and sugar-1-phosphates used, and it was discovered that this enzyme converts five different sugar-1-phosphate's and uridine triphosphate (UTP) to respective nucleotide sugars. This enzyme has been termed UDP-Sugar PPase due to its broad sugar-1-phosphate specificity. Initial biochemical characterization shows differences in kinetics between UDP-Sugar PPase and other substrate-specific PPases. Since there are other enzymatic pathways by which nucleotide sugars are made in vivo, it remains unclear what biological role UDP-Sugar PPase has in vivo and which is the major pathway toward nucleotide sugar production.

Striking the War Machine: The Anti-War Folklore of American Civilians and GI's during the Vietnam War

Betsy A. Beasley
Dr. Elissa Henken, Department of English, University of Georgia

Typical popular conceptions of the Vietnam War tend to construct two polarized camps of American reactions to the war. According to this view, "doves"—or those opposed to the war—consisted of college students, activists, hippies; "hawks"— those supporting the war—were the U.S. government, anyone involved in the U.S. military, and anyone over thirty. This dichotomy is problematic, as I discovered upon evaluating the folklore of the Vietnam War. I came to the project to look to the historical record to evaluate the chants, legends, personal experience narratives, jokes, folk songs, and folk images of both American civilians and enlisted Americans in Vietnam. A group's folklore concerning a specific topic like the war reflects as well as determines how the group feels about it; folklore both expresses a group's attitude toward the subject and influences how members of that group approach the subject, being affected as they are by folk culture. As such, historical

folklore, difficult as it is to collect, is imperative to a thorough examination of history. Through my research, I found that the dialogues of civilian protestors and of American GIs were more similar than different; in fact, most folk culture of American enlisted men was remarkably anti-war. While civilian protestors were more visible in their opposition, many American GIs fought against the war subtly, through their everyday speech rather than through marches and sit-ins. Although GI protest folklore did include some overtly anti-war speech, such as slogans on buttons distributed by Vietnam Veterans Against the War, most anti-war folklore took the form of jokes, songs, and rumors that only hinted at an anti-war message. The folklore of these GIs did not pronounce disapproval of the war, as did the folklore of civilian protestors. Rather, this form of GI folklore—as exemplified by one rumor that the toy company Mattel had manufactured the American military's M-16s—communicated a distrust of the war machine, and of the war itself, without resorting to slogans used by civilian protestors (such as "Hey, hey, LBJ, how many kids did you kill today?") that were much more explicit forms of protest. This study is significant in that it bridges the imagined irreconcilable opposition between GI and civilian protestor during the period. While each side implemented very different methods to demonstrate their contempt of the war, surprisingly a number of themes developed between the two sides, proving that, despite perceptions in the popular imagination, civilian protestors and American GIs were not such polar opposites after all.

The Effects of Media on Economic Policy and Business Decisions in Brazil and Argentina

Ashley N. Beebe – CURO SUMMER FELLOW
Dr. James Holmes, Center for International Trade and Security, University of Georgia

Despite strong, liberal medias in Brazil and Argentina, very little research analyzes the media in Latin American countries. My research analyzes how the media, business, and economic sectors interact in Brazil and Argentina. The research process included a thorough investigation of both through an interview with Dr. Anthony Pereira, Brazilian expert at Tulane University, the use of literature in the University library, and the use of various electronic news sources. The research reveals that Brazil's outlook in the business, media, and economic sectors is far more positive than Argentina's. This is true because Argentina, whose social and political infrastructure has been historically strong, is at the mercy of a weak economic situation. Everything from education to healthcare, the strength of the media to trust in the government, has been adversely affected by the recent economic collapse. While showing signs of growth, Argentina's nationalism, dwindling middle class, and the weakening social infrastructure all severely inhibit growth in the country. In contrast, Brazil is making great strides in erasing the effects of clientalism and personal favors that pervade the media, political, and business sectors. In addition, Brazil possesses a stabilizing economic and political situation, a market with huge potential for growth, and much of the infrastructure to support and maintain growth in the future.

Differentiation of Human Embryonic Stem Cells into Endothelial Progenitors

Ingrid Bloom – CURO SUMMER FELLOW
Dr. Steven Stice, Department of Animal and Dairy Science, University of Georgia

Endothelial cells line blood vessels and form the interface between circulating blood in the lumen and the rest of the vessel wall. Bone morphogenic protein-4 (BMP-4) is known to play a role in vascular development in other species, but its function in humans is unclear. An in vitro model of blood vessel development was designed to explore the role of BMP-4 in the formation of endothelial cells derived from human embryonic stem cells (hESC). The hypothesis was BMP-4 treatment of hESC preferentially directs differentiation toward endothelial cells.

Using a Pasteur pipette formed into a hook, hESC colonies were manually passaged onto collagen-laminin gel-coated plates. The colonies were grown with or without BMP-4 for

3 days, and BMP-4 supplementation was stopped. After 3-4 days in culture there was a dramatic reduction in the size of the BMP-4 treated colonies. In the untreated cultures, a "cell sheet" morphology grew along the gel surface in addition to "gel-invading" cells. In the BMP-4 treated cultures, the "invading" cells were seen, but the "cell sheet" was lacking. This led to the hypothesis BMP-4 inhibits hESC differentiation resulting in the "cell sheet" morphology. In addition, an extensive cell network resembling vascular capillaries was observed in the BMP-4 culture.

Fluorescence Activated Cell Sorting was used to detect an almost four-fold increase of cells expressing platelet-endothelial cell adhesion molecule-1, an endothelial protein marker, in the BMP-4 treated cultures. These data suggest that BMP-4 plays a role in the differentiation of hESC toward endothelial cells.

Construction of Three Rce1p Mutant Plasmids to Aid in the Characterization of Rce1p Enzymatic Activity

Sarah Breevoort
Dr. Walter Schmidt, Department of Biochemistry & Molecular Biology, University of Georgia

Rce1p is a relatively uncharacterized protease that is required for the post-translational processing of proteins containing a CaaX motif. The CaaX motif is composed of cysteine (C), two small aliphatic amino acids (a), and almost any amino acid (X) in the terminal position. CaaX proteins require post-translational modifications to exhibit biological activity. Rce1p cleaves the –aax potion of the CaaX motif of mammalian Ras proteins and the yeast **a**-factor pheromone in the CaaX modification pathway. Ras proteins play a significant role in signal transduction; however, the hyperactive form of Ras is associated with 30% of human cancer tumors, including more than 90% of pancreatic cancers and 50% of lung cancers. Inhibiting the post-translational modifications of Ras is proposed to disable, or at least moderate, its cancer-causing activity by rendering it biologically inactive. One possible means for Ras inhibition would be to block the activity of Rce1p. In this study, the ultimate goal is to characterize the enzymatic activity of Rce1p and Rce1p mutants through their interactions with inhibitors. Towards this end, three plasmids were constructed containing Rce1p mutants and expressed in yeast. The extracts were isolated, and the plasmids were analyzed for proper Rce1p expression in vivo by yeast patch mating. A second verification was obtained by western blot analysis. These plasmids will be used in conjunction with a larger pool of Rce1p plasmids encoding additional mutants for in vitro inhibitor profile studies. These studies may ultimately yield novel Rce1p inhibitors that may be useful as anti-cancer drugs.

Antagonistic Effects of Naturally Occurring Altered Peptide Ligands on *Trypanosoma cruzi*-specific CD8 T Cell Response

Melissa Cabinian – CURO SCHOLAR
Dr. Rick Tarleton, Department of Cellular Biology, University of Georgia

Persistent infection with the protozoan parasite *Trypanosoma cruzi* results in Chagas disease, the leading cause of heart failure in South America. Although infected hosts develop a vigorous anti-*T. cruzi* immune response, *T. cruzi* is able to resist complete immune clearance by evasion mechanisms not yet understood. CD8 T lymphocytes are responsible for immunity to intracellular pathogens and necessary for the control of *T. cruzi* infection. Peptide targets of the CD8 T cell response in *T. cruzi*-infected humans and mice are primarily encoded within the *trans*-sialidase (*ts)* gene superfamily. *T. cruzi* expresses numerous related *ts* proteins which may result in the presentation of altered peptide ligands (APLs) to responding T-cells. APLs can antagonize T cells specific for the homologous antigenic epitope through a low affinity interaction with the T cell receptor (TCR). In this study, the effects of APLs on the ability of naïve and effector TsKb20-specific T-cells to respond to TsKb20 (ANYKFTLV), a *ts*-derived cytotoxic T lymphocyte (CTL) epitope, are evaluated. Several APLs were shown to inhibit TsKb20-specific effector T cells from producing

interferon-γ in response to TsKb20. Future work will focus on evaluating the impact of APLs presented on cells targeted for cytotoxic killing by TsKb20-specific CD8 T-cells. Antagonism of the activation of naïve CD8 T-cells will also be assessed by vaccinating mice with dendritic cells presenting APLs and TsKb20, then measuring the subsequent T cell expansion using class I major histocompatibility tetramers specific for TsKb20. The identification of antagonistic APLs will allow us to investigate the role of TCR antagonism in the ability of *T. cruzi* to evade immune responses.

The Mythological Present

Ian Lewis Campbell – CURO SUMMER FELLOW
Dr. Glenn Wallis, Department of Religion, University of Georgia

Myth is believed to be a phenomenon of human culture that has been relegated to ancient man, a phenomena that our modern world has surpassed by scientific knowledge. Yet, myth exists in our modern society in a similar form. Myth is a tool of placement, identity, and understanding with which modern man uses to contemplate the world.

This paper presents a theory of how myth works in the present by answering several questions: What is Myth? How does myth arise and function? Who is the mythmaker? Kenneth Burke defines myth as "a narrative that effects identification within the community that takes it seriously, endorsing shared interests and confirming the given notion of order." It arises out the collective, social action of living in a politicized culture, and not only grants a semblance of order but is a foundation of authority. The myths we find in our contemporary political world are not static creations but are used by mythmakers (anyone in a position of authority that relies on myth for that authority) to create new myths that reinforce power.

Using past theories of myth formulated by Roland Barthes, Kenneth Burke and Ernst Cassirer, I will present a comprehensive theory that explains the function of myth in the present, western world, and the influence it has in our political lives.

Characterization of IS*492* insertion at the *eps* locus of *Pseudoalteromonas atlantica*

Peter R. Caruana
Dr. Anna Karls, Department of Microbiology, University of Georgia

Pseudoalteromonas atlantica is a pioneer biofilm-forming, Gram-negative bacterium that is found in water columns and on solid surfaces of the Atlantic and Pacific oceans. Expression of extracellular polysaccharides (EPS) is important in biofilm formation by bacteria. Interestingly, *P. atlantica* exhibits on-off phase variation of peripheral extracellular polysaccharide (^{P}EPS) production resulting in two colony morphologies, mucoid (M, $^{P}EPS^{+}$) and crenated (C, $^{P}EPS^{-}$). This phase variation is associated with the transposition of a mobile DNA element, IS*492*. The correlation between phase variation and insertion of IS*492* into *eps* genes that are required for ^{P}EPS production was investigated.

Independent crenated variants of mucoid *P. atlantica* were isolated and characterized by a polymerase chain reaction (PCR) assay in which the primers amplified a predicted target site in an *eps* gene on the chromosomal DNA. DNA sequencing of PCR products revealed the exact site of insertion for each isolate. My results suggest that a correlation exists between the insertion of IS*492* at the *eps* locus and the M→C phase variation. In addition, sequence data suggests that the insertion of IS*492* is site-specific, a feature not commonly associated with bacterial insertion sequences. To further characterize the target site preference of IS*492*, current experiments are designed to follow the insertion of a "genetically marked" IS*492* element following its introduction into *P. atlantica* via conjugation on a mobilizable suicide plasmid.

LHR Expression in Transfected Ovarian Cells

Priya Chandan

Dr. David Puett, Department of Biochemistry and Molecular Biology, University of Georgia

Ovarian cancer is the fifth most common cancer in women. Epidemiologic evidence implicates the gonadotropic hormones in the etiology of ovarian cancer, due to the correlation between high serum levels of the gonadotropic hormones and an increased risk of ovarian cancer. The gonadotropic hormone signaling pathway ultimately leads to the expression of matrix metalloproteinases (MMPs). MMPs degrade the proteins of the extracellular matrix, specifically collagen, which is a necessary function in both normal ovulation and tumor migration and invasion. This biochemical evidence substantiates the epidemiologic risk correlation. These studies test the hypothesis that stimulation of the luteinizing hormone receptor (LHR) in ovarian cells will lead to increased expression of MMPs and therefore contribute to ovarian tumorigenesis. LHR was introduced into a human ovarian cancer cell line (SKOV3), which does not express the receptor under normal culture conditions. The goal of the project is to determine the time point of peak LHR expression, stimulate the receptor with hCG (human choriogonadotropin) at this time point, and then analyze MMP expression due to LHR stimulation. Samples were taken at different time points and analyzed to determine LHR expression at the RNA level. Expression was found as early as 6 hours, with peak expression occurring at 25 hours. Further analysis of this peak in expression is needed. In addition, further research is needed to define the dose response of MMP protein expression following LHR activation.

Glycomics and Glycoproteomics on Complex Glycoprotein Mixtures: Optimization of Separation Methods for Glycopeptide and Oligosaccharide Analysis

Anureet J. Cheema
Dr. Michael Pierce, Department of Biochemistry and Molecular Biology, University of Georgia

Cell surface glycoprotein glycans are critical for cell-cell and cell-matrix interactions as well as regulation of cell growth and enzyme activity. Therefore, some of them are of particular importance as cancer biomarkers, which have altered glycosylation sites. The research reported here involved developing a standard procedure for the analysis of N-linked glycans as well as the sites of N-linked glycosylation in complex mixtures of glycoproteins, such as blood serum. As a reservoir of diverse proteins, serum can be of great importance in research and diagnosis of different disease stages. To reduce the interference of highly abundant proteins during analysis, albumin and immunoglobulin removal procedures were developed and optimized with blue sepharose and Protein A columns. Glycopeptides were isolated through a series of steps in which the serum glycoprotein mixture, devoid of albumin and immunoglobulins, was denatured, reduced, carboxyamidomethylated and trypsinized to fragment the peptides. From the peptide mixture, specific glycopeptides were isolated by size exclusion chromatography and lectin chromatography. Peptide N-glycoamidase F (PNGase F) was then used for the detachment of oligosaccharides, which were then subjected to permethylation and analyzed by Matrix Assisted Laser Desorption/Ionization-Time of Flight (MALDI-TOF) mass spectrometry. The deglycosylated oligosaccharides were also analyzed by Liquid Chromatography-Mass Spectrometry (LCMS/MS). The optimized procedure proved to be an efficient means of separating and identifying oligosaccharides in the complex glycoprotein mixture. In the future, such a procedure could be used to analyze serum and other complex glycoprotein mixtures in order to identify biomarkers for development and diseases, including cancer.

American Stranger

Shehzeen Choudhury
Dr. Judith Ortiz Cofer, Department of English, University of Georgia

My current project is a collection of short stories that explore cultural boundaries, political, and moral issues from national and international perspectives. I write about boundaries because they seem concrete at first glance but are in reality quite permeable. In the short story "American Stranger," I have tried to merge the

American world with the Bangladeshi world through the custom of the arranged marriage and the conflicts that ensue. All my stories are based on or inspired by true stories. Following the traditions of Bangladesh for fourteen years and seeing a cousin get married to a man who only saw her for a few seconds in candlelight made me want to explore the emotions that come with this experience shared by many in various corners of the world. Although the setting is unique, I believe the feelings of love, loss, sacrifice, and compromise that the story conveys are not restricted to one region in the world but are truly universal. Through this story I have tried to portray a world of traditions by describing the reactions from two different points of view. Here the distinct stories of two individuals from two different paths of life meet and are soon to become one.

Effects of Glycosaminoglycans and Pectins in Early Stages of Angiogenesis

Amy V. Chudgar
Dr. Carl Bergmann, Complex Carbohydrate Research Center, University of Georgia

Angiogenesis, or the sprouting of new blood vessels from pre-existing vessels, is a complex procedure that involves dozens of regulators and components and requires the precise orchestration of recruitment, migration, and interaction of endothelial cells, extracellular matrix (ECM) components, and growth factors. Although vessel formation is necessary for normal development, excessive or insufficient angiogenesis is harmful and leads to numerous pathologies, including tumor growth, inflammation, and ischemia. Glycosaminoglycans (GAGs) are a major component of the ECM and serve an important role in vessel formation by regulating smooth muscle cell proliferation, functioning as receptors for proangiogenic growth factors, and serving a critical role in cell adhesion, locomotion, and the insolubility of the ECM. Pectins are the major acidic polysaccharide component of plant cell matrices and serve similar functions in plants to those served by GAGs in animals. Pectins may offer a potent method of regulating angiogenesis. We have previously demonstrated that pectins are able to affect GAG degrading enzyme activity, and GAGs are able to affect pectin degrading enzymes (PDEs). To apply this information to angiogenic processes, we examined whether pectins could compete with GAGs, possibly inhibiting angiogenic events and offering therapeutic applications. An in vitro system mimicking early tube formation in angiogenesis was developed to study the process using human umbilical vein endothelial cells (HUVECs). The tube-forming assay was performed using different concentrations of GAGs and pectins, and experiments were analyzed through light and fluorescent microscopy. The results of these experiments will be presented.

Modeling the Effects of the North American Beaver (*Castor canadensis*) on Sub-Antarctic Stream Food Webs in the Cape Horn Archipelago, Chile

William M. Collier – CURO SUMMER FELLOW
Dr. Amy Rosemond, Institute of Ecology, University of Georgia

The North American beaver (*Castor canadensis*) was introduced into southern South America in 1946 and throughout the last half-century has established significant populations and expanded its range into Chile. Beavers alter both habitat and resources available to organisms in terrestrial and aquatic ecosystems, potentially affecting community composition and diversity, food web dynamics, and overall ecosystem processes. In this context, the goal of our research was to specifically address the influence of the beaver on species-level and trophic-level food web dynamics of streams. Effects of beaver were assessed using data from four catchments and three habitat types: natural stream reaches uninfluenced by beaver, beaver ponds created by damming, and reaches immediately downstream of beaver dams. Species-level richness and Shannon-Weiner diversity of aquatic macroinvertebrates were significantly reduced in beaver ponds compared to natural and downstream sites; however, these changes were accompanied by increased biomass and density of macroinvertebrates in

beaver pond sites. Using empirical data, we constructed descriptive models with STELLA™ modeling software to explicitly determine the effects of beaver on the aquatic communities impacted by their activities. A unique model was created for each habitat and then analyzed between habitat types to assess the impacts of beaver on the relative importance of both individual taxa and functional groups (groupings of taxa based on their feeding mode). Our results illustrate the large impact that beaver can have on sub-Antarctic stream food webs by significantly changing macroinvertebrate community composition, trophic structure, and energy flow from food resources to stream consumers.

Role of Calcium Independent Phopholipase A_2 ($iPLA_2$) in Phospholipid Metabolism in Chemotherapeutic–Induced Cancer Cell Death

Kimberly Coveney – CURO SUMMER FELLOW
Dr. Brian Cummings, Department of Pharmaceutical and Biomedical Sciences, University of Georgia

Phospholipase A_2s are historically classified into three categories, cytosolic Ca^{2+}- dependent PLA_2 ($cPLA_2$), secretory Ca^{2+}-dependent PLA_2 ($sPLA_2$) and Ca^{2+}-independent PLA_2 ($iPLA_2$). Like all phospholipases, $iPLA_2$s are activated by extracellular signals to cleave phospholipids, thereby releasing lipid fragments into the intracellular environment which then act as signaling molecules within the cell. Upon cleavage with $iPLA_2$, phospholipids release arachadonic acid and glycerol into the cell. Arachadonic acid then serves as an intracellular signaling molecule for the inflammation response.

Under normal conditions, phospholipases aid in the maintenance and upkeep of cellular bilayers, thereby playing an integral role in the viability of the cell. However, any artificial manipulation of the resident phospholipases could disrupt this type of cellular maintenance system fueled by the activity of phospholipases such as $iPLA_2$. This research focuses on the effect that bromoenol lactone (BEL), a calcium independent phospholipase A_2 ($iPLA_2$) inhibitor, has on cellular viability and the phospholipid profile of the cell. This pharmacological agent was administered alone and in conjunction with the chemotherapeutics vincristine and cisplatin to test the hypothesis that $iPLA_2$ inhibition mediates cell death in these cells by altering the release of death inducing lipid signals.

Prostate carcinomas (PC-3) and lung carcinomas (A549) were both examined to explore the effect that cell origin has on the reaction to the aforementioned treatments. Preliminary data show that the combinatorial therapy, which employs the simultaneous administration of BEL with a prescribed chemotherapeutic, is able to effectively decrease the amount of certain phospholipids within the cellular membrane while not altering others. The summation of death caused by the aforementioned chemotherapeutics and that caused by the inhibition of an integral enzyme involved in cellular membrane integrity ($iPLA_2$) is greater than that caused by chemotherapeutic use alone. Certain phospholipids, most notably 14:0-16:0 Phosphatidyl Choline, have shown such consistent decreases in numbers during combinatorial treatments that their role in membrane integrity and viability is being furthered examined.

Understanding Cellular Immortality: Telomere Functioning in Yeast

Nathan L. Crain
Dr. Michael McEachern, Department of Genetics, University of Georgia

Cellular immortality, a characteristic of carcinogenesis, is achieved through the maintenance of telomeres, the DNA-protein complexes found at the termini of eukaryotic chromosomes. Telomere maintenance occurs by two distinct mechanisms: repair by telomerase, a reverse transcriptase, or repair by recombination (RTE – *r*ecombinational *t*elomere *e*longation). Although the majority of human cancer cells utilize a telomerase-dependent maintenance pathway, about 5% of human cancers undergo a recombination method of telomere lengthening,

termed ALT (*a*lternative *l*engthening of *t*elomeres). RTE pathways are best understood in yeasts. Previously, the McEachern lab identified a mutation in the yeast *Kluyveromyces lactis*, stn1-M1, which maintains very long telomeres by recombination and closely resembles human ALT cells. Studies have shown the genes RAD50 and RAD59 are necessary for RTE in *Saccharomyces cerevisiae*. The objective of this study is to characterize the role of RAD50, RAD51 and RAD59 genes in determining telomere length by recombination in stn-M1 mutants. Crosses of the genes regulating telomere length were generated by tetrad analysis. The mutants were then plated on growth media and screened for colony morphology and telomere length. Our results have shown that the RAD59 gene is not required in *K. lactis* RTE. This might be explained by the fact that *S. cerevisiae* has telomeres heterogeneous in sequence, while *K. lactis*, like humans, has homogeneous telomeres. Further analysis of stn-M1 mutants will be presented.

Strategy and Intent Versus Function: A Comparative Study of Moro Islamic Liberation Front and the Shining Path, Two Terrorist Groups

Leigh E. Creighton – CURO APPRENTICE
Dr. Stephen Shellman, Department of International Affairs, University of Georgia

Terrorist groups are usually defined by the violent methods they use to achieve their stated goals as well as common goals, which generally entail the control of land, the desire to replace one government or regime with another, or a combination of the two. Throughout its history as well as the present, the Philippines has been a country known for its continuous onset of one terrorist group after the other. The Moro National Liberation Front (MNLF) of the Philippines aimed for the establishment of an independent Islamic State in the southern Philippines. The Shining Path (Sendero Luminoso), a Peruvian terrorist group founded in the late 1960s aimed to replace the Peruvian government with a peasant revolutionary regime and dispel all foreign influences. The focus of my paper is a comparison between the Shining Path's and MNLF's goals or intentions versus the actual results of their actions. I hypothesize that there will be a general congruence between many factors of the two groups, such as their targets, weapons, members and leaders. I am interested in the cause and effect relationship between the terrorist groups and their corresponding country's populace. I predict that the methods or tactics the terrorists use depends on the approval or disapproval from the populace.

AUX Launch: Art, Representation and Commerce on the Web

John Crowe – CURO SUMMER FELLOW
Professor Mark Callahan, Institute for Creative Exploration, University of Georgia

AUX Launch utilizes the web as a platform where the lines of separation between art, design, and commerce are blurred. Competition between traditional music industry distribution strategies and alternative models such as file-sharing and inexpensive downloads is contributing to the emergence of new web-based models of artistic representation and content distribution. This project combines creative and technological research in the creation of a web site that accompanies the publication of AUX, a collection of experimental sound from Athens, Georgia. The development of the AUX web site is one component of collaborative project supported by Ideas for Creative Exploration (ICE), an interdisciplinary initiative for advanced research in the arts at UGA. The initial stage of the project brought together recording artists who share a connection with Athens' thriving independent music scene and graduate students in the Lamar Dodd School of Art's acclaimed Printmaking and Book Arts program. The result was a limited-edition audio CD in unique packaging printed and assembled by hand. AUX Launch supports the distribution of the CD and will remain online as documentation of the project when the edition is no longer available. The site, AUXcd.com, provides information about the artists on the compilation and sense of context for the project within the global community. The development of the site is the result of individual effort using

Macromedia Flash software and original ActionScript programming. The project evolved through numerous prototypes and code refinements to launch-ready status. The innovative design reflects the unconventional nature of the compilation through the use of layered graphics, sound, animation, and minimal text. A dynamic interface activates subtle contrasts in color, negative space, and popup animations, creating moments of intuitive navigation and discovery.

The Effect of Polymer Scaffolds with Nanopillar Structures Fabricated Using Solvent Leaching/Gas Forming Method on Long Term Osteoblast Response

Sita M. Damaraju
Dr. William Kisaalita, Department of Biological and Agricultural Engineering, University of Georgia
(Sita Damaraju, Ke Cheng, Guigen Zhang, and William S. Kisaalita)

The main objective of bone tissue engineering is to design robust skeletal implants which mimic the mineral component and the microstructure of natural bone. As a result, the functions of osteoblasts (bone forming cells) are better controlled in the new bone formation. In this study, nanotechnology is being used to develop Poly (L-Lactic acid) (PLA) scaffold structures consisting of nanopillars which are made out of nano-hydroxyapatite (NHA). These structures are hypothesized to improve the control of osteoblast behavior and response. NHA/PLA scaffolds were fabricated by the solvent leaching/gas forming method with ammonium bicarbonate as the porogen additive. An advantage of these 3-D nano-structures is that they are fabricated without using any special equipment, and porosity of the scaffold can be easily controlled or modified by this method. The fabricated scaffold is highly porous, and the pores are interconnected. The average pore size is about 200 micrometers, which provides a greater surface area for cells growth. The TE-85 bone tumorigenic cells, obtained from a tumor infected bone, were cultured in the scaffolds. Because TE-85 cells can proliferate in vitro, they are an excellent model to investigate bone formation in vitro. Results indicate that TE-85 cells are biocompatible with the fabricated scaffolds to facilitate cell adhesion. Later, the osteoblasts will be seeded on fabricated scaffolds to investigate the adhesion, proliferation and long-term functionality and matrix production. The results observed will be compared to standard PLA scaffolds without nanopillars.

Theory and National Identity: Yugoslavia in the Late 1940s and 1950s

Michael W. Davis
Dr. Keith Langston, Department of Germanic and Slavic Languages, University of Georgia

During the late 1940s and 1950s, Tito's communist regime in Yugoslavia was forced to face the recurring conundrum facing Belgrade: how to assimilate the various ethnic and religious factions into a greater Yugoslav identity. Ethno-religious tensions had provided opposition to Yugoslav identity since the nation's inception in 1918, and prior governments had compensated by establishing Orthodox Serbian preeminence at the expense of the national minorities. Tito's regime established the most viable sense of a greater Yugoslav identity following its split with the Cominform in 1948, an event that forced the regime to contemplate how to draw upon the support of all its citizens in the face of Soviet and Western pressure. As historians such as George Hoffman, Charles McVicker, Fred Neal, and Paul Shoup note, Tito's regime devoted considerable effort toward generating a body of theory to underlie the new Yugoslav identity. Primarily this was accomplished through theoretical positions regarding domestic policies and foreign diplomacy. This paper will focus upon the theoretical positions (though not actual implementation) regarding the withering away of the state and party, rejection of collectivization of agriculture and recognition of the peasantry, socialist democracy, and nonalignment during the Cold War. The importance of these positions in reducing tensions between the ethno-religious factions will be discussed in context of the larger

struggle to establish a coherent Yugoslav identity.

Prediction of Maximum and Minimum Air Temperature of a 24-Hour Period with Artificial Neural Networks

Richard W. Dewey
Dr. Ronald McClendon, Department of Biological and Agricultural Engineering, University of Georgia

Foreknowledge of maximum and minimum temperatures is useful for the development of weather simulations and for the protection of crops from freezes. The goal of this study was to develop artificial neural network (ANN) models to predict maximum and minimum temperatures of a 24-hour period six hours before the beginning of that period. An ANN is a network of processing units connected in a manner similar to neurons. ANNs can automatically adjust themselves to predict trends in a data set. Using data from the Georgia Automated Environmental Network to train the ANNs and the mean absolute error (MAE) of ANN predictions as a performance measure, many ANN design factors were tested for their effects on performance. Air temperature, humidity, wind speed, solar radiation, and seasonality produced the lowest MAE when all were used together in an ANN. The optimum duration of recorded data for these inputs was in the range of 2 to 8 hours. "Ward Network" architectures tended to have lower MAEs for minimum temperature prediction than standard backpropagation networks, but both types of architecture had similar MAEs for maximum temperature prediction. Two ANNs with one output node each had lower MAE than one ANN with two output nodes. The best models developed had MAEs of 2.124 °C on maximum temperature prediction and 1.675 °C on minimum temperature prediction. Future research could experiment with other design decisions to improve the ANNs' performance on winter and spring days with high humidity and wind speed, which were the most error-inducing days.

The Enigmatic Origins of the Bell Beaker Phenomenon

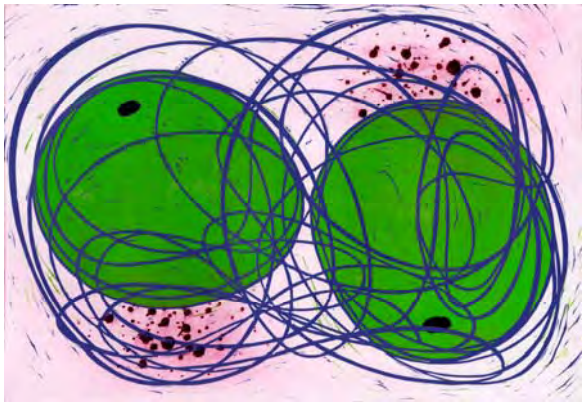
Jana Dopson
Dr. Ervan Garrison, Department of Anthropology and Department of Geology, University of Georgia

Bell Beaker pottery is an important, enigmatic, and well-documented phenomenon which appears suddenly and briefly in the archaeological record through most of Europe. These bell-shaped goblets are extremely uniform considering their geographic distribution and are surprisingly widespread considering their short persistence. Previous research has suggested a variety of diverse origins for the Bell Beakers including as status symbols associated with knowledge of copper metallurgy, and recent carbon dating indicates possible Iberian genesis. Thorough review of current literature in French and English provided the basis for investigation and was supplemented by interviews of leading Swiss Beaker archaeologists and on-site investigation of Swiss museum holdings. Two major points of contention in Beaker research include where the Beakers originated geographically and whether the Beakers indicate the spread of a people or simply the expansion of ideas. Stylistic analysis of goblet decoration led to many competing theories about Beaker origins, but modern radiocarbon data show that the Beakers are oldest in Iberia and get progressively younger to the north and east. Careful study of Beaker accompaniments has shown that regional ceramics are important to understanding the cultural and social settings of the Beaker period, and three distinct Beaker sub-cultures have been identified. The contemporary existence of these groups and the lack of evidence revealing large-scale migration imply that the archaeological Beaker culture is more representative of ideological, technological, and stylistic spread than en masse population movement. Beaker data are most consistent with a hypothesis supporting Iberian origins, metallurgy, and social status as important facets of Beaker success in Europe.

Containerized Shipping: A Gap in National Security

William M. Draxler & Joshua R. Heard,
Roosevelt @ UGA
Dr. Michael Speckhard, Department of International Affairs, University of Georgia

Although it is the lifeblood of the global economy, the containerized shipping system is also a major vulnerability in American national security. This key instrument of globalization has many economic advantages, but it also provides an avenue for criminal syndicates to engage in human trafficking and drug trafficking. Worse, a terrorist organization could very well use a shipping container as a delivery system for a weapon of mass destruction or to smuggle terrorists into the country. These containers could be used to transport illicit material to a destination where it would be used to construct a weapon of mass destruction. To address this threat, the Bureau of Customs and Border Protection has erected numerous programs to secure the supply chain, but these are riddled with problems. We propose a series of measures to correct the problems in two of these programs, the Container Security Initiative and the Customs-Trade Partnership Against Terrorism. These measures include increasing staff, distributing better detection equipment, and establishing the authority of customs officials to improve implementation of these programs. We also propose an independent measure for establishing a new standard in the security of ship manifests and also the development of a culture of security, both small steps in insuring security in every stage of the global supply chain.



Printmaking

Cameron Dye
Prof. Joe Sanders, Department of Printmaking, University of Georgia

My work is an exploration in aesthetics as I combine kitsch imagery along with a formalist sensibility. I am influenced by a wide variety of sources from the works of surrealists like André Masson and Stanley William Hayter to images from popular culture, such as cartoons, cereal boxes, and psychedelic posters. My prints usually begin as abstract, automatic drawings and slowly develop into images with intentionally cute and grotesque, representational imagery. I am interested in creating images with tension between opposing elements, such as cute and grotesque, or tasteful and tasteless, as a way of creating excitement.

Phenotypical and Genotypical Antibiotic Resistance Analyses of Fecal Bacteria Isolates in Dairy Cattle

Jodi L. Dyer
Dr. Susan Sanchez, Athens Diagnostic Lab, College of Veterinary Medicine, University of Georgia

The emergence of antibiotic resistance in both commensal and pathogenic bacteria throughout the world is being heightened by the overuse of antimicrobial therapies both in humans and in agricultural applications. Common therapeutic treatments in food animals are thought to play a major role in the selection of resistant bacterial strains within animals, and conjugation within the gastrointestinal tract has been suggested as a means of transfer for genes that confer this resistance between both individual bacteria and bacterial species. Phenotypic resistance characterization and gene specific screening were conducted for Gram negative, lactose fermenting, normal flora isolates, including Escherichia coli, for the antibiotic resistance genes flo, tetA, strA, strB, and ampC, which encode resistance for chloramphenicol and florfenicol, tetracycline, streptomycin, and ampicillin, respectively. Two genes typically found in a single locus in some conjugational plasmids isolated from Salmonella, tetA and strA, were concurrently present in 36% of the

tested Enterobacteriaceae isolates, while 68% of these additionally carried flo, also a common component of this location. Approximately 11% of the isolates contained all five of the genes. This study was carried out on bovine fecal samples from which multi-drug resistant (MDR) Salmonella had been isolated. The farms in this study were chosen because they were known to carry MDR Salmonella, and the therapeutic use of antibiotics was known and made available. The results of the Gram negative resistance screenings were compared to the profiles of these MDR Salmonella isolates. The presence of similar to greater proportions of these resistance genes in different bacterial species within the commensal bacteria of animals, as indicated by comparison to the Salmonella profiles, suggests the presence of a resistance reservoir within their common environment. The importance of this experiment is the potential implications that a growing antibiotic resistance gene pool within food livestock could have upon their conference to human populations and the rising difficulties of medicinal treatment.

Rock, Paper, Scissors
Lauren Dykes
Dr. David Saltz, Department of Theatre and Film Studies, University of Georgia

Three haunting stories of young women struggling with their bodies and the world surrounding them. The line between victim and violator is constantly blurred, with each girl left alone to discover if she is to blame for her pain.

The Effects of Cocaine on the Isolated Rabbit Heart and the Increased Cardiovascular Risk It Presents in the Presence of the Non-selective Beta Blocker Propranolol
Edmond N. Fomunung – CURO APPRENTICE
Dr. Benedict Lucchesi, Department of Pharmacology and Toxicology, University of Michigan Medical School

Cocaine, a crystalline alkaloid obtained from the leaves of the coca plant is highly addictive and potentially fatal. This has made its possession and distribution illegal in most parts of the world. The current study was performed to evaluate the biochemical processes underlying the toxic effects of cocaine on the heart. Cocaine has been reported to inhibit the reuptake of the certain neurotransmitters: norepinephrine, serotonin, and dopamine, and is known to block sodium channels. In this study, we sought to examine this mechanism of action and to evaluate the cardiovascular risk associated with the use of the beta-blocker propranolol. New Zealand white rabbit hearts were isolated and perfused at 30ml/min. The hearts were subjected to a period of hypoxia-reoxygenation, after which one was treated with cocaine, and another with both cocaine and propranolol. The electrocardiogram, coronary perfusion pressure, and left ventricular diastolic pressure were monitored closely on a trace using a multichannel recorder. Cocaine caused an immediate and drastic drop in both LVDP and CPP with eventual return to normal in the isolated heart. When the cocaine-exposed heart was treated with propranolol, the LVDP never recovered from the initial drop, and the heart eventually lost function. Our data suggest that cocaine exerts its toxicity on the isolated heart by significantly depressing heart function, as confirmed by the drop in LVDP and CPP. The data also suggest that when beta-blockers are introduced to a cocaine-exposed heart, the effects are particularly toxic and potentially fatal.

Being (Interpretations of Interpretations)
Charlotte Foster
Prof. Rebecca Enghauser, Department of Dance, University of Georgia
(Emily Crate, Charlotte Foster, Joseph Hutto, Leah Chapman, and Mary Mattmann)

Being (Interpretations of Interpretations) was developed through abstract gesture studies in the modern dance idiom. My goal was to develop new movement phrases which would produce an emotionally affective work. The abstract gesture studies were based on emotional responses to war, specifically the emotions of denial, courage, and detachment. Movement vocabulary was abstracted from photographs of people that exhibited strong emotion. I examined select photographs and identified details to influence

the shape, texture, and emotional response of my movement. These movements were threaded together using various speeds and dynamics that were determined in part by the dancers. Throughout the process, it became unnecessary that the audience draw a connection between my movement and war and more important that the audience have their own interpretation of the work.

Though each dancer brought a unique experience to the stage and had various strengths and weaknesses, they worked together as a congealed group, attempting to change their movement tendencies and adapt to each other. They also contributed largely to the creation of the piece in rehearsal. The dancers formed a supportive environment were I felt free to create, allowing me to experiment and grow as a choreographer. Without these specific dancers, this project would not have been so successful.

The Effect of *Aedes aegypti* Larval Nutrition on Metamorphosis

Laura Frame
Dr. Aparna Telang & Dr. Mark Brown, Department of Entomology, University of Georgia

Females of the mosquito species *Aedes aegypti* transmit yellow and dengue fever viruses through blood feeding on human hosts. An effective way to control viral outbreaks is to control mosquito populations in high risk areas. This is best done when mosquitoes are in their larval stage. Food for larvae can be limited by factors such as intra- and interspecific competition and the ephemeral nature of their aquatic habitat. Feeding by the last larval stage provides energy and nutrients required for growth, metamorphosis and reproduction. I hypothesized that if food for 4^{th} (final) stage larvae were limited, their ability to metamorphose and their resulting adult size would be affected. Specifically, I allowed 4^{th} stage larvae to feed for particular lengths of time and then housed them in fresh water only. When these larvae were allowed to feed for only 12 hours, few became adults, whereas most were developmentally arrested. Remarkably, arrested larvae survived for two weeks; and the implications for this survival await further study. Allowing larvae to feed for 24 hours resulted in 70% becoming adults. Female *A. aegypti* needed to feed longer as larvae to pupate compared to males. Females that fed longer as larvae attained a larger adult size. Female size has been found to strongly correlate to reproductive capacity, but how this affects her ability to transmit diseases awaits further study. This experiment indicated that food availability strongly affects the metamorphic capacity of *A. aegypti* larvae and thus limits mosquito populations.

Puppet Regimes

Mary Gassama – CURO APPRENTICE
Dr. Stephen Shellman, Department of International Affairs, University of Georgia

My research examines the political life of Laos and Cambodia in relation to Vietnam beginning from 1980. Although recognized as independent states, Laos and Cambodia were puppet regimes controlled by Vietnam. During the early 1980s, Vietnam had thousands of troops positioned in both Laos and Cambodia. Additionally, contact between the government of Vietnam and the governments of Cambodia and Laos exceeded the number of contacts usually made between sovereign states. Did Vietnam really control Laos and Cambodia? What steps did Vietnam take to gain a hold on both Laos and Cambodia? What characteristics did Laos and Cambodia have to make them susceptible to domination? What reasons did Vietnam have for wanting Laos and Cambodia under its control? My research considers these questions to understand the Laotian and Cambodian governments. I reviewed and examined sources such as the Xinhua General Overseas News Service and the British Broadcasting Corporation, paying special attention to the relationship between Vietnam, Cambodia, and Laos. Newspaper articles reporting the daily activities of the governments of Vietnam, Laos, and Cambodia provide evidence that Laos and Cambodia were puppet regimes. Although there have been academic books that detail the history of Indochina (Thailand, Vietnam, Laos, and Cambodia), books that focus on the relationship between

Vietnam, Laos, and Cambodia are uncommon. This research advances our knowledge of puppet regimes and the governments that control them: it displays the behaviors of dominating countries and their subordinates.

Ceramics
Alexis Gregg
Prof. Ted Saupe, Department of Ceramics, University of Georgia

My recent work in clay has taught me the power of intuition. I no longer dwell on the significance of what I'm doing. Instead, I allow my hand to respond to the surface as if I could close my eyes. The forms I have been creating give me an excitement and drive that I have not experienced before. It is as if clay has taught me to play, and when art making is fun, the results are also good. After the initial form is made, I step back and find the hidden faces and shapes that appear. I have come to realize the energy that is put into making a piece defines the energy it possesses on its own. Ultimately, I want my work to stand strongly as individuals with personality and mystery.

The Creation of 16S rDNA Clone Libraries for the Identification of Bacteria in the Gut Microbial Flora of *Drosophila melanogaster*
Kristen E. Habel
Dr. Larry Shimkets, Department of Microbiology, University of Georgia

Drosophila melanogaster has the longest history of any model organism and has been used by thousands of researchers around the world for over a century. In recent years these tiny organisms have played an important role in immunological and evolutionary ecology, specifically in the examination of immune effector systems and the role that pathogens play in the microevolutionary processes of these systems. Despite this abundance of research on host-pathogen interactions in Drosophila and the evolutionary consequences of these interactions, little is known about the normal microbial flora of Drosophila and the effect these bacteria have on host immunity. In this study, 16S rDNA gene sequences were used to identify bacterial species that make up the gut microbial flora of *Drosophila melanogaster*. Fly populations were collected from ten different longitudes along the East Coast, and two flies from each population were homogenized. Bacterial DNA was extracted from the homogenized flies and amplified using polymerase chain reaction. Gel electrophoresis was then used to isolate the target 16S rDNA sequences which were inserted into vectors and transformed into electrocompetent cells. The 16S rDNA gene in each plasmid was sequenced and examined with a local alignment algorithm to identify the different species of bacteria in each population. This data may indicate a clinal trend in the species of bacteria living in different fly populations and possibly allow for future studies of the microbial flora of Drosophila, including the identification of sexually transmitted bacteria.

Antibody Depletion of Highly Abundant Proteins in *Trypanosoma cruzi* for Fine-tuning of Proteomic Analysis
Matthew Haney – CURO SUMMER FELLOW
Dr. Rick Tarleton, Department of Cellular Biology, University of Georgia

Trypanosoma cruzi is a protozoan parasite that causes Chagas disease, the world's leading cause of congestive heart failure and a common cause of death in South America. Current treatments for Chagas are inadequate, though better understanding of parasite morphology could potentiate future treatments. Specifically, improved knowledge of *T. cruzi*-specific proteins may reveal novel candidate vaccines and potentially lead to improved treatment of the

disease. With this in mind, shotgun proteome analysis using liquid chromatography and tandem mass spectrometry identified roughly 3,000 *T. cruzi* proteins from the four major life-cycle stages (Atwood et al, 2005). Unfortunately, nearly 50% of all mass spectra collected mapped to only 8% of identified proteins, meaning a limited number of high-abundance proteins mask the detection of low-abundance proteins. To expose these low-abundance proteins to mass-spectrometric identification, protein-specific antibodies could be generated to bind to and remove the 67 high-abundance proteins from *T. cruzi.* To facilitate the subsequent cloning process, this protein group was first narrowed to 48 proteins based on homology. Previous lab efforts successfully cloned genes for 35 of the 48 proteins, so cloning of the 13 remaining genes was undertaken utilizing PCR amplification and the Invitrogen Gateway® technology. From a vector for protein expression, 32 of the total proteins were generated via autoinduction and purified under denaturing conditions. The antibodies subsequently produced to these 32 proteins in rabbits and mice will next be used to deplete high-abundance proteins from crude *T. cruzi* cell extracts before final mass-spectrometric analysis. The proteins identified by this new high-throughput proteomic analysis will verify *T. cruzi* genome annotations, identify new potential vaccine candidates, and further basic understanding of *T. cruzi* biology, hopefully leading to new and more effective treatments.

O-glycans and Congenital Muscular Dystrophy

Sana F. Hashmi – CURO APPRENTICE
Dr. Lance Wells, Department of Biochemistry and Molecular Biology, University of Georgia

Alpha-Dystroglycan (aDG) is a key glycoprotein necessary for proper neural and muscle function. In several forms of congenital muscular dystrophy, mutations exist not in the protein itself but in the glycosyltransferases necessary for the O-mannose addition and extension of the glycan structure necessary for proper aDG function. In order to map and characterize the glycans of aDG, the following objectives are being addressed. First, aDG is being purified from various sources. The initial protein sample, from rabbit skeletal muscle, has been purified based on its ability to interact with the lectin WGA (wheat germ agglutinin) and the extracellular protein laminin-1. Purity of the preparation was confirmed by SDS-PAGE followed by silver staining and tryptic digestion followed by LC-MS/MS analysis. aDG from brain has also been demonstrated to bind to the lectin WGA, confirming that it contains terminal sialic acid and/or N-acetylglucosamine glycans. Second, the glycans are being released by a combination of chemical and enzymatic steps for further characterization by chromatography and mass spectrometry. Third, the sites of glycosylation, with an emphasis on the disease-causing O-man sites, are being mapped using mass spectrometry techniques for O-glycosylation including neutral-loss MSn and beta-elimination/Michael addition approaches. This investigation sets the stage for future work in comparing aDG from various tissues, including mouse models of congenital muscular dystrophy. Defining the glycans and sites of modification is the first step toward assigning functional roles for the glycans and is an essential step toward the development of glycopeptide-based therapeutic approaches for treatment of several forms of congenital muscular dystrophy. This work is partially supported by grants from UGARF and MDA (LW).

Synthesis of Dipeptidyl Acyloxymethyl Ketones (AOMK) Inhibitors of Yeast Enzymes Rce1p and Ste24p

Ned W. Hembree – CURO SUMMER FELLOW
Dr. Timothy Dore, Department of Chemistry, University of Georgia

Thirty percent of all human cancers contain a mutated, mature form of Ras, a protein containing a C-terminal tetrapeptide sequence referred to as a CaaX motif. Proteins containing this motif undergo a three step post-translational modification pathway: isoprenylation of the cysteine residue, cleavage of the aaX group and carboxyl methylation of the newly exposed C-

terminal end. By inhibiting steps in this pathway it might be possible to create novel treatments for cancers caused by Ras mutations. The focus of the research conducted for this paper is to synthesize various dipeptidyl (acyloxy) methyl ketone (AOMK) inhibitors and test their inhibition properties on Ras converting enzyme (Rce1p) and Steril 24 (Ste24), two enzymes responsible for the proteolytic cleavage of the aaX motif in CaaX proteins. Selective inhibition of Rce1p interests us because of its essential role in the maturation of Ras. The potential inhibitors consist of a varied benzoate group attached to any of three different benzyloxy-protected dipeptides, Z-FK, Z-FA, and Z-FR. Using a fluorescence quenching assay, the percent activity relative to the uninhibited enzyme can be determined. These activities, coupled with the inhibitory activity of other compounds are needed so that an inhibitor profile of Rce1p and Ste24p can be established. The goal is to investigate if selective inhibition of each enzyme is possible.

Homer's Voice Recalled: Christopher Logue's *Iliad* Accounts

Alicia Higginbotham – CURO SUMMER FELLOW
Dr. Thomas Cerbu, Department of Comparative Literature, University of Georgia

British actor, pornography writer, and poet Christopher Logue has been translating pieces of the *Iliad* since 1959 and has never learned a word of Greek. His translations, each containing only one or two segments of the 24-segment whole, make reference to Shakespeare, World War II, and Revlon lipstick ads. He has left behind the formal constraints of what scholar D. S. Carne-Ross calls "translationese" to find the voice of Homer once again.

Obviously, such an undertaking confronts many problems. Like any translation, Logue's *Iliad* must honor the original while also creating a new poem in English that responds to contemporary modes of thought. Logue also must contend with the long tradition of *Iliad* translations that precede his. Using translation theory, critical studies of both Logue and Homer, and interviews with Logue and current translation scholars, I explore the success of Logue's translations within both the postmodern poetry and classics studies communities.

Christopher Logue feels responsible to these scholarly fields only secondarily, however. The passion that pushes him to continue revising and adding to his *Iliad* segments is the conversation he has through the poem about the legacy of war. By connecting Logue's translations to his body of original poetry and by exploring supplementary texts which he found especially enlightening throughout his work, I will show how the *Iliad*, possibly the greatest war poem in history, is the perfect vehicle for Logue to make a statement on, among other episodes of violence, the Vietnam War, the war in Iraq, and the current trend of international terrorism.

Isolation and Characterization of a Novel Heterotrophic Anaerobic Thermophile from the Uzon Caldera (Kamchatka, Russia)

Maggie M. Hodges
Dr. Paul Schroeder, Department of Geology, University of Georgia

Microbiologists have been seeking to characterize the microbial ecology of systems such as deep sea vents, geothermal hot springs, salt lakes, and acid-mine drainage sites, hoping to form a more complete picture of the environment in which organisms on ancestral earth would have thrived. The anaerobic chemolithoheterotrophs and chemolithoautotrophs living in these ecological niches are reminiscent of the earliest life forms present on earth, anaerobic archaea and bacteria. The Kamchatka Microbial Observatory is an international/interdisciplinary program supported by the National Science Foundation which has as a goal the elucidation of the interactions that connect the geology, microbial ecology, and geochemistry in the terrestrial hot springs of the Uzon Caldera. Located on the far-eastern Russian peninsula of Kamchatka, the Uzon Caldera is a host for microbial diversity that is found across a wide range of physical and geochemical gradients, including magmatic and meteoric (atmospheric) water sources. Twenty-

five isolates were obtained from samples retrieved during the 2003 field season, in addition to four isolates acquired from samples brought back in 2004. The glycolitic and peptidolytic anaerobic thermophile that was isolated from these field samples indicates a novel species, exhibiting 98% 16s rDNA sequence similarity to Caldanaerobacter subterraneous subsp. tencongensis. This isolate has a temperature growth range from 44-76°C, with an optimal temperature for growth at 62-63°C. The optimal pH25°C for growth of the isolate fell between 6.3-6.7, while incubated at 72°C. Future research will seek to further describe the geology and geochemistry of the hot spring in which this new species was discovered

Para Risas?: The Relationship between Sports and Gender in an Ecuadorian Fishing Village

Michael J. Hotard
Dr. Michael Harris, Department of Anthropology, University of Georgia

Golosina, Ecuador is a small fishing village in which there are clear gender divisions between males and females. These divisions are brightly reflected in the sporting activities that are common throughout the village. However, sport is also a site in which ordinary gender roles are relaxed and challenged. It offers individual women ways to temporarily transcend their gendered social restrictions; but as an institution, it serves to strengthen, reinforce, and magnify entrenched gender divisions in Golosinana life. This paper explores articulations between sports and gender in Golosina. The cultural significance given to sports in this small village allows its effects to ramify beyond the court or field and into other domains of village life. By examining the behavior of the town's athletes and the construction of their sporting events, I will show how some gender roles in the village are reproduced. I will analyze the disparities in formal opportunities for males and females and the differences in how male and female athletes view themselves and each other. Through these comparisons, I discuss how gender roles are reflected in the institution of sport and how this institution itself serves to reinforce such roles. This study is specific to Golosinan life, but the patterns and social forces it reveals can be applied to other cultures as well.

Matrigel Invasion Assay for Ovarian Cancer Cell Lines

Staci R. Hutsell
Dr. David Puett, Department of Biochemistry and Molecular Biology, University of Georgia

Ovarian cancer is the fifth most common cancer in women, and approximately 16,000 women die annually from this disease. Metastatic invasion, one hallmark of cancerous growth, can be viewed as a series of stages: escape from the primary tumor and intravasation into the vascular systems, survival in the circulation and avoidance of host defense mechanisms, arrest at a new site and extravasation into the tissue, and finally growth at the new site. Several in vitro assays mimic this in vivo metastatic process. The objective of this project was to develop and implement an assay for cell invasiveness which could be used to determine the metastatic effects of hormonal stimulation of the luteinizing hormone receptor. Using a Boyden chamber insert design, cells invading through Matrigel, a synthetic tissue barrier, were stained and counted. Percent invasion was determined by dividing the average number of invading cells by the average number of migrating cells for each cell line. The invasion index was determined by dividing the percent invasion for the test cell line by the percent invasion of the control cell line. The invasive properties of the BG-1 ovarian cancer cell line (70% invasion) were similar to the positive control cell line HT-1080 (60-70% invasion), whereas the CaOV3 ovarian adenocarcinoma cell line was considerably less invasive (15% invasion). The invasion indexes for BG-1 and CaOV3 were calculated to be approximately 1.2 and 0.2, respectively. In addition, the luteinizing hormone receptor (LHR) and a constitutively active LHR mutant were introduced into BG-1 cells to compare the invasive properties of wild type and mutant receptor. Comparing invasion through matrigel after stimulation of the introduced receptor, the results show no significant contribution of LHR

stimulation to the invasive properties of the cells. Therefore, metastasis will occur with or without LHR stimulation, and further research will determine pathways to increased cellular invasion.

Attention!Deficit-Hyperactivity:Disorder?
Joseph Hutto
Prof. Rebecca Enghauser, Department of Dance, University of Georgia
(Joseph Hutto, Mary Mattman, Laura Henry, Montez Nash, and Leah Chapman)

With this project I set out initially to create a piece that was very personal and about some very serious issues but also to create a piece that was light hearted and entertaining at the same time. I intended to create from my own personal experience of my childhood and adolescence and thus created characters out of my actual family members. I then decided to put this personal history up against my own personal relationship history and created characters out of all of my ex-girlfriends or ex-crushes. This covers my life story from early childhood to today and highlights certain events throughout. I then decided to satire each of these moments and to make the piece humorous. I titled the piece "Attention!Deficit-Hyperactivity:Disorder?" in reference to the fact that I do actually struggle with this disorder and have for a long time. This allowed me to utilize the image of changing channels on the television screen, which is a frequent example of what ADHD feels like. This helped me to incorporate the TV sitcom elements and tied in the music as well. I was originally greatly inspired by the music, which is all from television shows, movies, and video games from my childhood to today. I chose music that was appropriate to each scene or scenario and also that was without lyrics, so that they would not interfere with my artistic expression in each case. I attempted to weave all of these elements together to create a colorful fantastic farce of actual events and to better tell my story.

Assessing Opinions of Georgia Residents on Poverty and Labor Markets in 2005
Jamarri J. Ivy – CURO APPRENTICE
Dr. James Bason, Survey Research Center, University of Georgia

Poverty inflicts some 210,000 families in the State of Georgia. Identified as a social problem, poverty has far-reaching and detrimental effects on Georgia's economy, as well as overall society. A 2004 poll by the Carl Vinson Institute of Government concluded that Georgians are highly concerned with the problem and show pessimism about a future solution to poverty. My research examines the opinions of 500 Georgia residents during October 2005 on issues relating to poverty. Census Bureau reports released in August of 2005 show that poverty rates are still on the rise, and household incomes failed to increase for the 5th straight year. The Georgia Poll directly deals with opinions on causes of poverty, definitions of poverty, labor markets across various demographics, and how the worsening state of the economy has had an effect on Georgians. The statewide RDD telephone survey was conducted at the Survey Research Center. Based on the fact that poverty is one of the major problems afflicting the state, the research will examine whether the results of the Carl Vinson Institute of Government Poll still apply to the opinions of Georgians in 2005, in light of higher poverty levels since the 2004 poll. The results help to further knowledge of the public's perception of poverty, the relationship between the current poverty level and the opinions of Georgians, and the overall resolve of Georgia residents to solve the problem. When a social problem is as sweeping as is the case with poverty, a collective effort becomes ideal.

Hepatic Expression of Deiodinase-1 in the Rat
Natalie M. Jennings – CURO APPRENTICE
Dr. Duncan Ferguson, Department of Physiology and Pharmacology, University of Georgia

This study examined the effects of thyroid-inhibiting drug PTU on the hypothalamic-pituitary-thyroid regulation of pregnant rats and their offspring. The thyroid gland regulates basal metabolism and is critical in growth and development. The purpose of this research is to understand the developmental differences of rat

thyroid status through the comparison of data from each level of PTU exposure among various age groups. Pregnant rats were exposed to PTU in drinking water from gestation until weaning. There were three levels of PTU exposure: 0, 3, and 10 ppm, and three age groups under study: pup (offspring), dam (mother), and adult (pup 2 months after weaning, last exposure to PTU). Deiodinase 1 (D1) enzyme, which converts thyroid hormones T4 to T3 through the removal of iodide, was examined in liver homogenates. To determine D1 mRNA expression, mRNA was extracted and D1-specific mRNA was quantified with real-time PCR. Liver assays measured D1 activity based on the amounts of 125I produced when D1 removed iodide from radioactive rT3. Relative D1 levels are expected to decrease with increasing PTU doses, with the thyroid status of the dams affecting that of their offspring. The relative amount and expression of liver D1 can then later be analyzed along with other data to broaden the understanding of developmental interruptions. The information using this standard anti-thyroid drug will establish a foundation for other studies evaluating other thyroid disruptors such as perchlorate, a chemical that is an environmental hazard in human drinking water in many areas of the U.S.

Design of an Inducible System for Expression of the Human Luteinizing Hormone Receptor

Barrett Jones
Dr. Susanne Warrenfeltz, Department of Biochemistry and Molecular Biology, University of Georgia

The human luteinizing hormone receptor (hLHR) is a G-protein coupled receptor that is vital for human reproduction, but its expression may influence the formation or progression of ovarian cancer. hLHR expression has been shown to decline from low-grade to high-grade ovarian cancer and is much lower in malignant ovarian epithelial tumors than in benign ovarian epithelial tumors. An inducible expression system which provides regulated expression of hLHR in ovarian cancer cells may allow for the elucidation of a correlation between hLHR expression and ovarian cancer. The goal of this project was to produce a plasmid that, when introduced to ovarian cancer cells, places the expression of hLHR under the tetracycline responsive element. Primers were designed and synthesized for PCR amplification of hLHR that provide the correct restriction sites needed for insertion into the pTRE2hyg2-6xHN expression vector. Attempts made to ligate the insert and vector and transfect competent E. coli cells with the ligation mixture were unsuccessful. In the future, once the ligation is successful and the hLHR-pTRE2hyg2-6xHN plasmid is complete, the plasmid can be introduced into ovarian cancer cells that lack hLHR since residual expression could compromise control over the total hLHR expression levels in the transformants. The transformants can then be monitored at different hLHR expression levels for matrigel invasion characteristics and be compared to wild type ovarian cells from the same line to reveal any changes in cancer aggressiveness.

Creative Writing

Betsy Jones
Dr. Phil Williams, Franklin College of Arts & Sciences, University of Georgia

This piece is a non-fiction narrative that explores the theme of home (what it is and how it is constructed) and how a sense of place and a relationship with the natural world directly affect the creation of home.

Edward Abbey begins *Desert Solitaire* with a simple observation: “Every man, every woman, carries in heart and mind the image of the ideal place, the right place, the one, true home, known or unknown, actual or visionary.” Locating that true home can be a life struggle.

Writing about “home” is tricky. Home is the topic of many a bumper sticker and crocheted pillow. It’s where the heart is, there’s no place like it, and it’s where they have to take you in. Home depends on many factors: rooms, memories, people, tastes and smells. But, it also involves an understanding of the natural world outside of the kitchens and Christmas decorations. This understanding and

relationship, what Emerson calls "an original relation to the universe," is key in connecting with the past and the future, key to crafting a home.

The Role of Sympathetic Nerves in Leptin-induced Loss of Body Fat

Lisa Jordan – CURO SUMMER FELLOW
Dr. Ruth Harris, Department of Food & Nutrition, University of Georgia

Leptin is an adipocyte-derived hormone involved in energy metabolism and body weight regulation. Leptin reduces body fat when administered to experimental animals, but it is unclear why obese individuals remain fat while possessing high circulating levels of leptin. Understanding leptin's functions and mechanisms could provide insight about possible leptin malfunction in these individuals. One possible mechanism by which leptin could reduce body fat is by activating the sympathetic nervous system (SNS) to increase lipid mobilization from adipocytes. Here the effect of continuous infusion of leptin on peripheral sympathetic nerve activity, as measured by norepinephrine turnover (NETO), was investigated in both white adipose tissue (WAT), the major fat storage site, and brown adipose tissue (BAT), the major site for thermogenesis in rodents. It was hypothesized that leptin would increase NETO in these tissues. Fifty-five male Sprague-Dawley rats were divided into three treatment groups: leptin-infused, control, and pair-fed. Pair-fed rats were used to control for the inhibitory effect of leptin on food intake and were restricted to food intake of leptin-infused rats. Rats were infused for four days with 40µg per day of leptin or phosphate buffered saline from intraperitoneal miniosmotic pumps. Leptin affected sympathetic activity in a depot-specific manner. NETO in inguinal WAT was significantly increased in leptin-infused and pair-fed rats compared with controls. NETO in intrascapular BAT was significantly increased in leptin-infused rats compared with controls and was even further increased in pair-fed rats. Leptin did not increase NETO in retroperitoneal, epididymal, or mesenteric pads. There was no relationship between increased NETO and reduction in size of fat pads, suggesting that the SNS does not account for the specific reduction of body fat in leptin treated animals.

Tangerine Blush: Engineering Soybean to Produce β-carotene in Seed Cotyledons

Blake L. Joyce
Dr. Wayne Parrott, Department of Crop and Soil Sciences, University of Georgia

Consumers associate quality of food with color and flavor. Without certain carotenoids egg yolks, butter, and even shrimp would be white instead of their expected color. Soybean meal is a chief source of animal feed in the US but is devoid of carotenoids. If soybean feed already contained carotenoids, farming industries would have a more economical choice for animal feed. The goal of the project was to genetically engineer soybean to produce carotene, the precursor for other agriculturally important carotenoids. Soybean embryos were transformed using microprojectile bombardment with a plasmid containing the phytoene synthase (crtB) from Erwinia uredovora gene for phytoene, placed behind a cotyledon specific promoter and with hygromycin resistance as the selectable marker. Endogenous soybean enzymes then change the phytoene into β-Carotene. Three engineered lines were obtained. One line of the three turned orange, denoting the successful expression of carotene in the seed tissues. Engineering with additional genes for carotenoid synthesis should allow for production of other carotenoids, such as canthaxanthin.

Development of a Diagnostic Test for *Mycobacterium avium*

Simon Kahsay
Dr. Russell Karls, Department of Infectious Diseases, University of Georgia
(Simon Kahsay, Russell Karls, and Craig Greene)

Mycobacterium avium is a bacterium that resists common antibacterials due to the presence of very long fatty acids (mycolates) in its cell wall that constitute an extremely hydrophobic barrier. *M. avium* is virtually ubiquitous in soil and water and can cause tuberculosis-type diseases

in immune-compromised humans, birds, and genetically-predisposed pet animals, such as miniature schnauzer and Bassett hound dogs and Abyssinian cats. Effective treatment of infected pets requires the prompt institution of anti-mycobacterial therapy; however, no clinical test is available to veterinarians for the rapid diagnosis of *M. avium*. The work presented in this report describes progress toward the production of a polymerase chain reaction (PCR) assay for the rapid detection of this bacterium in clinical samples. Oligonucleotide primers designed to recognize a discriminatory region of the *M. avium* 16S rRNA operon produced the expected PCR product with purified *M. avium* DNA. Annealing temperature, extension time, and number of cycles were optimized to enhance the efficiency of the PCR reaction and the product yield. The PCR assay was used with crude DNA templates obtained from *M. avium* bacilli following various cell lysis approaches (boiling, mechanical disruption, and use of detergents). Mechanical lysis was found to be essential for detection of the PCR product. Current research is investigating modifications to cell lysis procedures to detect these bacteria in the presence of host cells and tissues. The results of these experiments are anticipated to aid production of an assay that will enable clinicians to rapidly screen for the presence of this bacterium.

"Fracturing Fairy Tales": Lu Xun's Old Tales Retold Reveal Power in Ancient Chinese Mythology

Laura B. Kearns
Dr. Kam-ming Wong, Department of Comparative Literature, University of Georgia

A society's mythology often represents its belief system and cultural practices. The study of mythology as it changes over time thus allows one to perceive and understand stages in history. Lu Xun's Old Tales Retold, written from 1922 to 1935 following China's 1919 May Fourth Movement, exaggerates mythology's historical value to comment on a pivotal piece of Chinese history. The text's eight short stories find their basis in classical Chinese myths that had once been the core of China's culture. These ancient myths had helped shape the ancient feudal and Confucian society that subsisted until its collapse in 1911 with the birth of the Republic of China. As an outsider seeking an insider's knowledge of Chinese culture, I read not only English translations on the May Fourth Movement and Lu Xun's life, but I also translated and compared the Chinese texts of Lu Xun's Old Tales Retold and the vernacular and ancient Chinese myths that were the basis of Lu Xun's book. When the ancient government and society were drastically shifting, Lu Xun transformed ancient, essential myths into modern stories to convey his opinion on the permanency and significance of the changing circumstances. Native Chinese scholars have done studies on Lu Xun's Old Tales Retold, but a foreigner's comparative study of Lu Xun's text and ancient Chinese myths allows a fresh perspective. By explaining how Old Tales Retold reveals both the significance of a certain historical period and the perception of an individual's (Lu Xun's) beliefs, this analysis will permit me to demonstrate the true insight mythology has of mankind.

The Effects of Social Experience on Aggressive Behavior in Drosophila

Jayne M. Kelly
Dr. Yong-Kyu Kim, Department of Genetics, University of Georgia

Aggressive behavior is observed in all animals, including humans. Prior data showed that aggression is influenced by genes as well as environment. To determine what affects aggression in fruit flies, and ultimately humans, both *Drosophila melanogaster* and *D. pseudoobscura* were observed. The amount of aggression exhibited by flies with varying amounts of social interaction and by flies of different ages was compared. It is predicted that socially-isolated flies will exhibit more aggression than socialized flies, while older flies should display more aggression than their younger counterparts. In order to test these predictions, a plastic arena and a video camera were used to observe pairs of similar flies in three combinations. These included: isolated (I) vs. isolated (I), socialized (S) vs. socialized (S),

and isolated (I) vs. socialized (S). Isolated flies represented those raised with no social interaction since before birth, while the socialized flies were those raised in groups since birth. During observations seven behaviors were tallied: chasing, wing vibration, wing threat, fencing, boxing, holding, and lunging. Social isolation seems to play a part in the amount of aggression exhibited by the flies. This is supported by the fact that, in regard to a few of the aggressive behaviors, the isolated flies demonstrated significantly more aggression than the socialized flies for both *D. melanogaster* and *D. pseudoobscura*. We did not see the effect of age on Drosophila aggressive behavior, but further research with substantially different age groups may provide further insight into this topic. By determining what influences aggression in Drosophila, including a lack of social experience and age, we obtain a better understanding of the factors that may affect aggression in humans.

Healing Arts: The Use of Drama Therapy in Treating People Suffering from Trauma

Carey J. Kirk – CURO SUMMER FELLOW
Dr. David Saltz, Department of Theatre & Film Studies, University of Georgia

This study investigates the use of a relatively new field in the treatment of trauma survivors: drama therapy. Bosnian teachers suffering from trauma were interviewed on their experiences participating in a five-year drama therapy program provided by the ArtReach Foundation. Questions included describing themselves before the program began, how they felt while taking part in the drama therapy sessions, and how they believe the program affected them personally and as a teacher. The effectiveness of drama therapy as a treatment for trauma is assessed through the improvement of these teachers as measured by their self-reported changes. Possible reasons for the teachers' improvements were inferred by comparing the teachers' self-reported experiences to themes that emerged in my participant observations of drama therapy sessions in Atlanta, Bosnia, and New York, and in literature on drama therapy and trauma. These reasons include: the use of metaphors and props to provide distance, a heavier reliance on movement and visual stimuli that is shown to better access the implicit memories formed during a traumatic event, the incorporation of 'surplus reality', and techniques such as role-reversal and scene directing that provide the trauma survivor with insight and a safe and guided environment in which to enact their repetition compulsions. Based on these results, further research could more quantitatively measure symptom improvement by using the Trauma Symptom Checklist or Harvard Trauma Questionnaire and compare the effectiveness of drama therapy to talk-based therapies in the treatment of trauma.

Systems Biology of the Quinic Acid Cluster in *Neurospora crassa*

Allison L. Koch
Dr. Jonathan Arnold, Department of Genetics, University of Georgia

Neurospora crassa is a widely used model system for biological research. This bread mold contains the quinic acid gene cluster, which encodes the organism's pathway for utilizing quinic acid as a carbon source. When *N. crassa* is grown on sucrose medium, the quinic acid gene cluster is inactive. When the organism is shifted to a medium that has quinic acid instead of sucrose, the quinic acid cluster genes are activated. To see the gradual changes in expression of these genes, samples were taken at multiple time points after the shift to quinic acid. The RNA samples from these time points were analyzed with micro array chips, which gave the precise measurements of the RNA levels of each of the 11,000 genes in the genome. These RNA measurements at the multiple time points were compared to predictions of a genetic network model. A genetic network has three collections of reactions with genes and their products as species: (i) Central Dogma describing how genes make proteins; (ii) a biochemical pathway describing what the proteins do; (iii) how certain proteins regulate gene expression. This model makes predictions of the changes in the quantities of RNA under the same experimental conditions. If the data agree with the predicted values of the model, then the genetic network is

validated. We would have a validation, for example, of what proteins do and how genes are regulated. Thus, measured RNA levels of all genes allow us to validate the molecular mechanism by which *N. crassa* utilizes a carbon source.

Identification of a New IS Element from *Streptomyces coelicolor*.

Alina Kuo
Dr. Janet Westpheling, Department of Genetics, University of Georgia
(Alina Kuo, Karen Stirrett, and Janet Westpheling)

Insertion sequences (IS) are genetic elements (in most cases, self mobilizing DNA fragments) that move from place to place in the genome. In the process, they may alter gene expression, inactivate genes, or cause gene rearrangements. These elements may also be used as tools to direct changes in gene expression or insert foreign genes of interest into chromosomes and thus allow for stable genetic manipulation.

Streptomyces are common soil bacteria that produce the vast majority of natural antibiotic products and pharmacologically active metabolites used in human and animal health care. Many of the most important strains are genetically uncharacterized and do not respond to classic genetic manipulation. Here we report the identification of a previously unknown IS element from *Streptomyces coelicolor* that is capable of genetic transfer to a variety of relatively uncharacterized antibiotic producing strains. An 836 bp DNA fragment containing an IS element isolated from the *Streptomyces* phage MRT displayed the capacity for phage mediated recombination between various *Streptomyces* spp. Subsequent conjugation experiments revealed differences in the frequency of insertion for three species of *Streptomyces*. Using phage DNA as a probe, the presence of an IS element in these strains was confirmed by Southern hybridization which showed that insertion was apparently random. A series of experiments and techniques are being used to identify the element's target sequence by locating the junction fragment between the IS element and the site of insertion in the chromosome. The broad host range of this element, the fact that it inserts randomly, and its relatively small size make it a potentially excellent tool for the genetic manipulation of important antibiotic producing strains for which there are relatively few genetic tools.

Striking A Balance: How Young Children Hammer

Sonika Kushwaha & Sarah Reagin
Dr. Dorothy Fragaszy, Department of Psychology, University of Georgia
Dr. Kathy Simpson, Department of Kinesiology, University of Georgia

Striking an object using a tool (a hammer), has been an essential manual skill in human history. Based on a dynamical systems perspective, a person 'self-organizes' movements relative to factors shaping the movement, e.g., gravity or motor development. The study's purpose was to determine if older versus younger children would move more joints to produce increased hammering velocity and striking accuracy and exhibit more posturally stable positions during hammering. We videotaped 26 children (12, 18 and 24 mo.) while they hammered a peg. The child's body positioning and arm striking technique were coded. The youngest children typically sat in symmetrical leg positions, with their legs in full contact with the ground. Older children sat with an increased variety of leg positions. Younger children used shoulder extension or rotation to move the entire arm as a unit; older children primarily utilized elbow flexion/extension with some wrist motion. The leg positions adopted by the younger children increased postural stability to resist gravitational torques. The developmental shift from moving the arm primarily about the shoulder to the elbow and wrist joints during striking follows Schöner's and Dounskaia's predictions that a multi-joint movement skill progresses from single to multi-joint motions and from proximal to more distal joints. Biomechanically, the elbow flexion and extension strategy is more likely to require less muscular torque to produce the movement. These findings are, to date, the first to portray the progression of motor patterns

from less to more biomechanically effective striking when using a tool.

Student Willingness to Pay to Avoid Unpleasant Odors on Campus

Victoria S. LeBeaux
Dr. Jeff Mullen, Department of Agricultural and Applied Economics, University of Georgia

The city of Athens is proud to be home to the University of Georgia, with its renowned academic and athletic programs. Unfortunately, the city is also home to a number of problems linked to the University's successful growth. Among these problems are those faced by the wastewater treatment facilities which serve Athens. These treatment plants, built in the 1960s, were not designed to handle the volume of wastewater which is now generated in Athens. One of the results of these outdated and under-equipped facilities, is a foul odor which permeates the east side of the campus. Replacing the plants will cost approximately $170 million. This study will examine the students' attitudes about the odor and determine their willingness to pay for eliminating the problem. Students living in University Housing will be randomly selected to participate. The study will be administered as a contingent valuation survey through interviews and the mail. A key goal of the survey is to eliminate possible bias. This will be accomplished by asking both closed and open ended questions and by varying the payment vehicles and the numeric starting point of the valuation question. Full results from the survey have not been attained at this date. Preliminary data, however, suggest that underclassmen, students who do not work to support themselves, and students who live closest to the treatment plant will be willing to pay the most money to eliminate the smell. Resultant data provide significant information concerning the value students place on public goods.

Pulmonary Responses to Ozone in Obese Mice

Anna Lee
Dr. Stephanie Shore, Department of Public Health, Harvard School of Public Health

Recent epidemiological data suggest that obesity can be a causative factor for asthma. The mechanistic basis of this relationship is yet to be fully discovered. Data from this lab indicate that obese mice as a result of a genetic deficiency in either leptin (*ob/ob* mice) or the long form of the leptin receptor (*db/db* mice) have increased responses to ozone, an asthma trigger, compared to lean wild-type mice. To determine the reason for these differences, we measured pulmonary expression of TNFα and IL-1β since both have been proposed to play a role in the induction of neutrophil chemotactic factors following ozone exposure. We also measured the short form of the leptin receptor, Ob-Rα, in *db/db* versus wild-type mice to determine whether leptin can signal through Ob-Rα in *db/db* mice. The experimental procedure began with exposing *ob/ob*, *db/db* and wild-type mice to 2ppm ozone or room air for 3 hours and harvesting the lungs 4 or 24 hours after the cessation of ozone or room air. RNA was extracted from homogenized lung tissue and reverse transcribed for real time RT-PCR. Our results showed that there is a direct incremental increase in TNFα and IL-1β pulmonary mRNA expression only for the *db/db* mice after ozone exposure. The real time PCR for the Ob-Rα gene indicates that it is very strongly expressed in both wild type and *db/db* mice. Our data indicate that *db/db* mice differ from *ob/ob* likely as a result of leptin signaling through the short leptin receptor isoform, which may account for observed differences in responses to ozone in these mice.

The Evolution of Virulence in a Two Disease System

Andrew Leidner – CURO SUMMER FELLOW
Dr. Pejman Rohani, Department of Ecology, University of Georgia

An important issue in population biology is the dynamic interaction between pathogens. Interest has focused mainly on the indirect interaction of pathogen strains, mediated by cross immunity. However, a mechanism has recently been proposed for 'ecological interference' between pathogens through the removal of individuals from the susceptible pool after an acute infection. In 2003, Rohani et al. explored this

possibility through modeling historical measles and whooping cough records. They showed that ecological interference is particularly strong when infections are fatal and permanently remove susceptibles. Based on these interactions between two competing diseases, Rohani et al. demonstrated disease interference has substantial dynamical consequences, making multi-annual outbreaks of different infections characteristically out of phase. This ecological interaction between diseases may have even more profound implications for the evolution of competing pathogens. To examine the evolutionary aspects of multi-pathogen communities, we have formulated a stochastic agent-based model. We show that the evolutionary consequences of interference for pathogen virulence are substantial and counter-intuitive.

Family Involvement in Education: Is there a Magic Bullet?

Brian L. Levy, Roosevelt @ UGA
Dr. Larry Nackerud, School of Social Work, University of Georgia

Resonating with voters and seemingly necessary, education reform has become a growing concern in the American political climate. This anxiety seems justified, as an alarming 10% of all individuals between the ages of sixteen and twenty-four have not completed high school and are not currently enrolled (Child Trends DataBank 2004). Empirically, parental involvement has been touted as an answer to America's educational woes. Still, as is evidenced by the Family Involvement Initiative of 1994, policies to improve involvement are undeniably general and lack specific emphasis on socio-ethnic variations between parents. This is an interesting approach, considering the discrepant rates of dropout for different ethnicities: Hispanic individuals at 24%, Black American individuals at 12%, and White American individuals under 7% (Child Trends DataBank 2004). This policy analysis, through an exhaustive academic literature review, argues that the overall effect of parental involvement on academic achievement is moderated by ethnicity. More specifically, different parenting styles and forms of involvement are noted to be more or less efficacious for varying races. Upon a comprehensive synthesis of the literature, I conclude with an examination of the flaws in current American policy and recommendation for necessary changes. A holistic approach that recognizes the importance of ethnic diversity and its relation to parenting styles and involvement, as well as the value of long-lasting outreach programs, is found to be most effective.

Identifying GPI-Anchored Proteins in Breast Cancer Cells

Chen Lin – CURO APPRENTICE
Dr. Michael Pierce, Department of Biochemistry and Molecular Biology, University of Georgia

According to the American Cancer Society, more than 200,000 people are diagnosed with invasive breast cancer in the United States alone. If preemptive symptoms can be identified, this number will be significantly reduced. The linkage between glycosylphosphatidylinositol (GPI), anchored proteins found on the plasma membranes of eukaryotic cells, and cancer cells is a new frontier of science. Few GPI-anchored proteins have been identified, although their synthesis is associated with the Golgi and the rest of the secretory system. Most GPIs are recognized in their free form, or when covalently linked to proteins or sugars. They serve many roles that include acting as enzymes and as receptors in cell adhesion. Another characteristic of GPIs that has been previously shown is that they bind to Clostridium septicum (a bacteria) alpha toxins, which will help us identify these proteins. We used these alpha toxins to explore GPI-anchored proteins in relation to cancerous breast cells. Mass spectrometry was used to identify the GPI-anchored proteins present. The purposes of these experiments were to collect and identify GPI-anchored proteins from membrane fractions and determine if breast carcinoma cells display significantly more GPI-anchored proteins than non-diseased breast tissue. If there appears to be a correlation between GPI-anchored proteins and their prevalence in breast cancer cells, then they can become possible indicators for the cancer,

which will aid in developing early detection diagnostic techniques in the future.

A Conserved Neural Signaling Pathway Regulates Hunger-induced Stress Tolerance in Drosophila

Patrick R. Lingo
Dr. Ping Shen, Department of Cellular Biology, University of Georgia

All animals have an innate tendency to avoid stress. Moreover, their stress tolerance can be modified based on physiological needs. This study is designed to test the hypothesis that the regulatory mechanism(s) underlying stress response might be evolutionarily conserved in diverse animals, including humans. Using the fruit fly, *Drosophila melanogastor*, as a model, we previously showed that Drosophila neuropeptide F (NPF, a homolog of human neuropeptide Y, NPY) and its receptor NPFR1 promote acquisition of less accessible/palatable foods in starved larvae. Here we describe a simple assay to assess foraging activities of larvae under stressful conditions (noxious, low temperatures). In the assay, larvae (deprived or non-deprived) are introduced to pre-chilled foods, ranging in temperatures from 11°C-20°C. Their feeding activities are indicated, semi-quantitatively, by the presence of dyed food in the gut. At 11°C, wild-type fed larvae showed little feeding response, while a majority of larvae fasted for two hours displayed feeding activity. We further show that the NPF system is responsible for hunger-driven, cold-resistant foraging: overexpression of NPFR1 in fed larvae proved sufficient to significantly increase feeding activity. Conversely, down-regulation of NPFR1 expression in deprived larvae suppressed feeding response. These findings suggest that activity of the conserved NPY-like system is an essential component of the dynamic regulation of stress tolerance in response to an animal's physiological needs. A conserved Drosophila insulin-like signaling system has been shown to directly regulate the NPY-like system. We are currently investigating the role of fly insulin-like signaling in stress response.

Risk Communication among Non-Clinical Healthcare Employees: The Key to Preserving Infrastructure in a Medical Emergency

Lindsay Looft & Kevin Chang, Roosevelt @ UGA
Dr. Corrie Brown, Department of Pathology, University of Georgia

During a threatening medical outbreak, non-clinical hospital employees play an essential role in maintaining a functional healthcare environment. An intact infrastructure allows healthcare professionals to provide immediate quality care. However, without proper knowledge of an infection's risks, many employees fail to arrive at their workplace out of fear for their personal safety. The events at the Morgan Processing and Distribution Center, where traces of anthrax caused absenteeism rates to reach thirty percent, evidence the consequences of such a scenario. To prevent situations of this nature, it is imperative the Department of Health and Human Services, in conjunction with the Centers for Disease Control and Prevention, develop a curriculum for risk communication. In this circumstance, risk communication means providing employees with an empowering knowledge of disease that creates a sense of personal safety and security which, based on literature reviews and interviews with hospital employees, will serve as an effective means of reducing absenteeism rates. Then, hospital leaders should be responsible for communicating risk and protection methods to staff members. This proposal recommends the first curricula on risk communication focus on anthrax, a biological agent, and avian flu, an emerging infectious disease. These curricula should communicate general risks of both infectious diseases and bioterrorism. Further, they should aim to dispel common public misperceptions of the two genres of threat. Additionally, there must be official records of all employees who have received available vaccinations, in the unlikely spread to hospital workers. Risk communication among non-clinical workers is crucial in cultivating a sense of security, thus ensuring

fully capable healthcare systems in the face of a medical emergency.

Permethylation of 2-Aminopyridine Labeled Oligosaccharides: Facilitating the Analysis of Complex Glycan Mixtures

Lindsay Looft
Dr. Michael Pierce, Department of Biochemistry & Molecular Biology, University of Georgia
(Lindsay Looft, Gerardo Alvarez-Manilla, and Michael Pierce)

Oligosaccharide moieties from glycoproteins are responsible for many physiological functions including cell-cell and cell-matrix interactions. The structural analysis of these oligosaccharides facilitates the understanding of their role in oncogenesis and development. Through labeling with fluorescent tags, such as 2-aminopyridine (2-AP), oligosaccharides can be easily detected and quantified when separated by high performance liquid chromatography (HPLC). Despite this sensitivity, it is difficult to assign oligosaccharide identity using this methodology without suitable standards. Another means of analyzing oligosaccharides is through permethylation, which homogenizes charge density and creates a non-polar compound that can be easily analyzed by matrix assisted laser desorption ionization-time of flight (MALDI-TOF) mass spectrometry. Though this particular method enables glycan identification with excellent resolution, it can be difficult to analyze glycans in complex mixtures due to the presence of many peaks. Additionally, permethylation is not suitable for glycan quantification and modifies the chemical nature of oligosaccharides, thus rendering them useless for other physiological studies. For these reasons, it is desirable to fractionate and quantify oligosaccharides prior to permethylation; however, the current standard procedure for permethylation results in incomplete derivatization when applied to 2-AP labeled oligosaccharides. In this study, oligosaccharides prepared from glycoproteins, such as human orosomucoid, bovine thyroglobulin, and fibrinogen, were purified after proteolysis and Peptide N-glycoamidase F (PNGase F) release and a portion of them was labeled with 2-AP. A method of permethylation is being developed for an accurate and reliable structural analysis of these oligosaccharides using MALDI-TOF. Ultimately, the successful permethylation of 2-AP labeled glycans will facilitate the analysis of complex biological samples such as tissues, serum, or cell lines.

Migration of the Avant-garde in Early Modernist Visual Art: The Question of Sequence in Innovative Form and Ideology

Laura C. Mackert
Dr. David Roberts, Department of History, University of Georgia

My research explores the intellectual and artistic migration from Europe to the United States—from Paris to New York City—that occurred during the first few decades of the twentieth century. I examine the adoption and adaptation of Europe's Early Modernism by the American cultural elite. In particular, I discuss New York's Greenwich Village—Alfred Stieglitz and the 291 Gallery, the Arensberg Circle, the Armory Show, the cohabitation of European and American members of the avant-garde—and the place it held in further Modernist innovation, both in America and abroad. I treat my study of the intellectual migration of Early Modernism as a case in which I examine how such phenomenal innovation proliferates among individuals and whole cultures. Specifically, I am interested in the relationship between avant-garde technique and avant-garde idea. Analyzing the relationship between form and ideology, scholars often conclude that technique necessarily succeeds idea in the arts. In "Early Modernism: Literature, Music, and Painting in Europe, 1900-1916," for example, Christopher Butler favors the notion that new techniques develop to accommodate and express new ideology. Not convinced that this chronology accurately describes the relationship between Modernist form and ideology, I critically examine the historiography of this pivotal moment in Early Modernism—the movement of the avant-garde from Europe to America—in order to test analyses like that of Butler. Even if ideological innovation conventionally precedes technical innovation, the phenomenon of Modernism may have

manipulated this sequence. Perhaps innovation in form played a more influential role in the development of Modernism than many scholars acknowledge. Citing the unique occasion of the artistic and intellectual migration in the early twentieth century, I argue that Modernist form and idea developed simultaneously, and that often avant-garde technique even inspired innovative ideology.

Effect of Introduced Predator, the American Mink (*Mustela vison*) on Ground Nesting Songbirds in the Cape Horn Archipeligo, Chile

Brett M. Maley
Dr. Amy Rosemond, Institute of Ecology, University of Georgia

Invasive species are one of the greatest threats to global biodiversity. The American mink, *Mustela vison*, was introduced to Tierra del Fuego Island (southern Chile) to begin a fur trade in the 1940s. The fur industry was not successful, and now the predatory mink has invaded a large part of the Fuegian/Cape Horn Archipelago. The mink has only been present on Navarino Island, where our study was conducted, for approximately three years. We expected mink to have a significant negative impact on ground-nesting songbird nests via egg predation because mink are known to be predators of such nests, and they lack an evolutionary history with birds in this area. To test this hypothesis, we used artificial nests and eggs and the Mayfield method to quantify nest predation in four different habitats: anthropogenically impacted shrublands, beaver meadows, secondary forest, and primary forest. Predators were identified by the teeth marks in the plasticine eggs. The mink was found to be the most frequent nest predator, with birds being the other major source of attack on artificial eggs. Mink depredation events were more frequent in disturbed habitats, i.e. shrublands and beaver meadows than in less disturbed habitats. While artificial nests may overestimate the importance of small avian predators, this study showed that mink can be a major threat to ground nesting songbirds in the Cape Horn area. Further, the greater effect of mink in more disturbed habitats suggests that conservation and management efforts may need to be prioritized in those areas.

Female Choice in Sexual Selection in *Drosophila pseudoobscura*

Jon McGough – CURO SUMMER FELLOW
Dr. Wyatt Anderson, Department of Genetics, University of Georgia

In some Drosophila species, single females are surrounded by multiple males in nature. Classically, females are choosy and perhaps select high fitness males. Therefore, genes of high fitness should be passed to future generations. Using isofemale lines from *D. pseudoobscura*, we tested the hypothesis that Drosophila females mate randomly among males, expecting to find that females chose males of higher fitness more often than males of lower fitness. For each observation period, fourteen sexually mature males were individually marked with fine dots of paint and released into a glass cage where they were allowed to mate with single females that were later introduced to the cage. Cuticular hydrocarbon levels and mating speeds were subsequently measured for the males that did not mate or mated multiple times. Current data show that approximately 20% of males were not accepted by females, about 30% mated 1-2 times, and about 10% mated more than 10 times during the 5-day period. Similar trends were observed for *D. melanogaster* and *D. hydei*. Also, differences were found in the levels of male-dominant cuticular hydrocarbons between males that mated multiple times and ones that did not mate. Multiply-mated males produced significantly more male pheromones and mated more quickly with females. Due to the variation in mating frequency among males, these results suggest that *D. pseudoobscura* females mate non-randomly. The results also suggest cuticular hydrocarbon levels and mating speeds can serve as indicators of individual vigor and physical status in males.

The Employment of Fiscal Policy as the Primary Means of Controlling Inflation and Promoting Short-Term Stabilization, with

Focus on the 1980s and 1990s in the United States

Balaji L. Narain
Dr. Harrison Hartman, Department of Economics, University of Georgia

The purpose of this research was to analyze the various effects of fiscal and monetary policies on inflation and real GDP from 1980 through 2000. At present, most officials in Congress, the Executive Branch, and the Federal Reserve propound that the central bank is better suited to promoting stabilization in the short-term, defined here as less than one year. Using data compiled from the St. Louis Federal Reserve's archive of economic information and the IRS website, average tax rates, average Federal Funds rates, levels of changes in federal funds rates and tax rates, inflation rates, and GDP were calculated for the years 1980 through 2000. Data were compared against one another to identify trends as to which policy method produced greater effect in the short term. It was predicted that fiscal policies, usually involving a longer inside time lag than monetary policy, reflected a much shorter outside time lag, implying that fiscal policies are more effective in the short run. As expected, the data illustrated that increases in the money supply or decreases in interest rates did not see an associated increase in GDP until an average of one year later. By contrast, fiscal policies produced an associated increase or decrease in GDP within an average of two to three months after being signed into law. Congress should thus make greater use of its ability to foster economic growth. The concluding recommendation would then be for increased coordination between Congress and the Federal Reserve to promote stable short-term GDP growth.

Evolution of US Trade Policy: A Reconsideration of US Anti-Dumping Laws

Balaji L. Narain & Kate Bryant, Roosevelt @ UGA
Dr. James Holmes, Center for International Trade and Security, University of Georgia

The purpose of this research was to analyze the malignant effects of anti-dumping margins on American trade with China. Congress has continued to maintain its stance toward China as a non-market economy. This leaves China open to punitive damages when goods produced in China sell at a price in the United States varying either from the price of the good sold in China or at a price lower than marginal cost of production. In recent years, Congress has displayed a proclivity to enact stringent anti-dumping margins on Chinese imports. More detrimental than general tariffs, anti-dumping margins compel foreign producers to collude with domestic manufacturers, damaging consumers and downstream manufacturers by forcing them to negotiate with collusive producers. When the price of imported unfinished production factors rises, export sector manufacturers must lower expenses to remain in business, usually accomplished by reducing employment levels. Thus, antidumping margins protect a small segment of the population at the expense of a larger segment. After reviewing Congressional Budget Office and Commerce Department data, we compared estimated losses, including legal fees and rent seeking, to estimated benefits computed by the Commerce Department, thus ascertaining that anti-dumping margins impose a net loss on society. Fortunately, there are numerous policy options to increase American competitiveness without anti-dumping margins. Government subsidization of tertiary education will allow more American students to pursue higher studies and contribute more effectively to global commerce. Additionally, reducing the Federal budget deficit will reduce the trade deficit by helping US goods sell less expensively overseas.

Adapting Yeast for the Study of Pitrilysin and other M16A Enzymes

Tatyanna Nienow – CURO SUMMER FELLOW
Dr. Walter Schmidt, Department of Biochemistry and Molecular Biology, University of Georgia

Pitrilysin is a zinc-dependent metalloprotease found in *Escherichia coli*. Although it was first discovered more than a decade ago, there is still little known about its function in *E. coli*; not

even the natural substrate of pitrilysin is known. Pitrilysin shares significant homology with several other proteases, including Ste23p and Axl1p, involved in the production of the a-factor mating pheromone in the yeast *Saccharomyces cerevisiae*, and human insulin-degrading enzyme (IDE), which has been implicated as a potential factor both in Type 2 diabetes, and in the formation of beta amyloid plaques found in Alzheimer's Disease. All four proteases, when inserted into yeast, can cleave a-factor in vivo. All four proteases share several highly conserved sequence motifs, but only one, the HXXEH motif common to this family of metalloproteases, is known to be important for protease function. Site-directed mutations were introduced into the HXXEH motif and several other conserved motifs of pitrilyisn through PCR-mediated recombinational cloning. After verifying the presence of the desired mutation through DNA sequencing, the activity of the mutated proteases were determined through an in vivo yeast mating assay. Several of the mutations showed a complete loss of measurable activity, suggesting that those residues are necessary for function. This is the first time there has been any demonstration of sequences outside the metalloprotease motif being necessary for protease function. The success of this assay also demonstrates the effectiveness of the yeast mating pheromone pathway for functional studies of these enzymes.

Effects of a Boring Lichen on Shell Strength of the Marsh Periwinkle Snail *Littoraria irrorata*

Carmel L. Norman
Dr. David Porter, Department of Plant Biology, University of Georgia

The marsh periwinkle snail *Littoraria irrorata* is an herbivorous gastropod commonly found in tidal salt marshes of the eastern United States. It has been observed that the shells of many *L. irrorata* individuals are colonized by the lichen *Pyrenocollema halodytes* which bores into and erodes the snail shells. This study is an investigation of how the degree of colonization of the lichen affects the snail shell strength. The hypothesis is that increased colonization by the lichen leads to decreased shell strength, and decreased shell strength could make the snails more susceptible to predation by blue crabs and diamondback terrapins. The experimental snails will be collected from salt marshes near the University of Georgia Marine Institute on Sapelo Island, Georgia. Snails of different sizes and differing degrees of lichen colonization will be tested. Forces needed to cause cracking of the shell will be applied and measured using an Instron 2401 materials testing machine. The biomass of lichen on each shell will be measured by weight from the cracked and then decalcified shell. Changes in the snail density could have ecosystem-wide implications. Silliman and Bertness (2002, PNAS 99:10500) have described salt marsh trophic dynamics as a cascade of predation by blue crabs on snails which graze on the salt marsh cordgrass, *Spartina alterniflora*.

Development of Real-time PCR to Measure mRNA Expression of Stress Peptides in Specific Brain Nuclei of Rats

Ezinne A. Okwandu – CURO SCHOLAR, CURO APPRENTICE
Dr. Ruth Harris, Department of Food and Nutrition, University of Georgia

Stress induces release of the neuropeptides corticotrophin releasing factor (CRF) and urocortin (UCN), which, generate a variety of stress responses including activation of the hypothalamic-adrenal pituitary (HPA) axis and release of the stress hormone corticosterone. Previous findings reveal that feeding high fat (HF) diets increased weight loss and corticosterone release in stressed rats. The next step is determining whether the increased response to stress is associated with increased release of CRF and UCN in areas of the brain that influence food intake and the HPA axis. Real-time PCR is faster and more quantitative than in-situ hybridization. Therefore, methodology has been developed to measure mRNA expression of CRF and UCN in specific brain nuclei. A rat brain atlas was used to identify the coordinates of the paraventricular nucleus (PVN) of the hypothalamus, which expresses CRF mRNA, and of the Edhinger

Westphal nucleus, which expresses UCN mRNA. A cryostat was used to make 500 um slices at appropriate coordinates in the brain, and then small tissue punches were made from these nuclei. Total RNA was extracted from the tissue and used to measure mRNA expression by Real-time PCR, using 18S rRNA expression as an internal standard. Total RNA extraction from very small amounts of tissue was optimized, and we determined that 35-50 ug of tissue collected from bilateral 0.75 um diameter PVN punches was adequate for measurement of CRF mRNA. This technique will be used to measure the effects of HF diet and of stress on neuropeptide expression in specific brain nuclei.

Carolina

Ezinne A. Okwandu – CURO SCHOLAR, CURO APPRENTICE
Dr. Pamela B. Kleiber, Center for Undergraduate Research Opportunities, University of Georgia

This dance is choreographed to a song called "Carolina," in which the singer praises a beautiful girl named Carolina. The dance reflects my belief that each girl is an embodiment of the beautiful Carolina. The style of the dance and the dancers' dress is contemporary/traditional West African.

Forwarding the Agenda of the Right: The Intercollegiate Studies Institute's (ISI) Influence on Campus Student Newspapers

Kathryn E. Otrosina
Dr. Kathleen deMarrais, Department of Elementary and Social Studies, University of Georgia

The Intercollegiate Studies Institute (ISI), founded in 1953 by Frank Chodorov, aims to further the ideals of the conservative movement. Under the presidency of E. Victor Milione in the 1970s, the ISI began paying special attention to eliminating the liberal bias in higher education. The ISI's Collegiate Network now sponsors 95 college newspapers around the country to mentor young members as part of a larger conservative agenda (deMarrais 2005, Saloma 1984). The purpose of this study is to examine how ISI's College Network influences young adults through their involvement in campus-based student newspapers. This paper uses a case study approach to examine the CN's national Campus Magazine Online in comparison to three other ISI/CN-sponsored newspapers at Dartmouth, UCLA, and the University of Georgia. Research questions include: 1. How does the CN's Campus Magazine Online influence the content of the three university publications? 2. What structure does ISI use to attract and inform student members? An analysis of the Campus Magazine Online in comparison to the three other ISI-sponsored newspapers demonstrates there are large sums of money given to these alternative student newspapers. Second, the ISI uses specific, well-developed strategies to inculcate students into the rightist ideology through the use of networking, lectures, internships, conferences, and fellowships. Third, the ISI introduces young members to influential, high-powered conservatives, many of whom came through the ISI system themselves, to give the students something to aspire to. Through these student publications, future leaders in the conservative cause learn how to forward the agenda of the right.

Construction & Expression of Fusion Protein yHCG1 & LHR ECD & ECLs for Expression in Insect Cells

Travis M. Palmer
Dr. David Puett, Department of Biochemistry and Molecular Biology, University of Georgia

The luteinizing hormone receptor (LHR) is a vital component to the overall scheme of reproduction and differentiation in many male and female vertebrates. The LHR belongs to an even larger category called Glycoprotein Coupled Receptors, which is composed of an extracellular domain (ECD), seven transmembrane section, three extracellular loops (ECLs), and three intracellular loops. Previous research suggests that the ECD of the LHR is sufficient for high-affinity binding of the hormone and that the ECLs of the receptor are not required for this high-affinity interaction. However, experiments also suggest that the

ECLs may contribute to signal-transduction events and may directly contact the hormone. Therefore, the construction and subsequent use of a single-chain ECD-ECL fusion protein (which contains both the alpha and beta subunits of hCG, the LHR ECD, and its three ECLs) in binding studies may measure any contact between the ECLs and hCG. This fusion-protein construct was designed to include the appropriate ECL DNA segments. These segments were amplified by the use of the Polymerase Chain Reaction (PCR) and will be subsequently ligated together to form the complete fusion-protein construct. After infection of this construct in an insect-cell system, binding studies will provide insight into the structural mechanism by which hCG binds LHR and activates a signal cascade. Understanding this important mechanism may contribute to the understanding of constrictively-activated and other malfunctioning Lars that lead to either infertility or precocious puberty.

The Genomic Instability of Human Embryonic Stem Cells

Kurinji Pandiyan – CURO SCHOLAR, CURO SUMMER FELLOW
Dr. Steve Stice, Department of Animal and Dairy Science, University of Georgia

Human Embryonic Stem Cells (hESCs) are undifferentiated, pluripotent cells obtained from the blastocyst stage of the human embryo. Before these cells can be used for different medical applications, it is crucial to address the fundamental question of how hESCs maintain their self-renewal properties without increasing genomic instability. It is known that the proliferation of most cell populations results in alteration of telomere (ends of chromosomes that are involved in the replication and stability of DNA molecules) dynamics. This is significant because alteration in telomere dynamics can induce chromosomal abnormalities that could eventually trigger cancer mechanisms. It is crucial to understand which method of culturing hESCs is least likely to induce telomere shortening. This project was designed to compare the different methods of culturing hESCs and to investigate the correlation between telomere length and the integrity of hESCs and how both are affected by different passaging conditions. Our hypothesis was that bulk-passaging techniques resulted in more telomere shortening of hESCs than manual passaging. Genomic DNA was extracted from hESCs cultured by enzymatic and manual passaging techniques and digested using the restriction enzymes Hinf1 and Rsa1. Southern blotting was done to the digested DNA using a radioactively labeled oligo A10 probe specific to telomeres. The telomeric repeats did not appear in many of the samples, primarily due to insufficient DNA loaded. However, one of the bulk-passaged samples did exhibit bands corresponding to a high molecular weight (>20kb). This result is interesting in that normal hESCs have been found to exhibit telomeric DNA of molecular weight (8-10kb), and we expected shortening of telomere length due to bulk passaging. We assume that this data could be due to inefficient restriction digestion. The procedure will be repeated with new samples generated using different passaging techniques.

Activation of Innate Immune Response by Wild-type and Attenuated Rabies Virus

Marlena L. Pichon – CURO APPRENTICE
Dr. Zhen Fu, Department of Pathology, University of Georgia

Rabies virus (RV) infects the Central Nervous System (CNS) beginning at the spinal cord and continuing up to the brain. Despite extensive research in the past 100 years, the pathogenic mechanism by which RV causes neurological diseases is not completely known. At the time of death, only mild inflammation and neuronal damages were seen in patients. Recently, our laboratory has shown that wild-type RV evades the innate immune responses, thus contributing to its pathogenicity. Functional genomics investigation has indicated that attenuated RV activates host innate immune responses, particularly the interferon (IFN) and chemokine pathways. On the other hand, wild-type RV does not activate these pathways. We have used real time-polymerase chain reaction (PCR) to confirm the microarray data. Mice infected with attenuated B2C or wild-type silver-haired bat

RV (SHBRV) were sacrificed and brains were removed for RNA extraction. Real time-PCR was performed on the expression of chemokines such as Rantes, IP-10, MIP-1, and MCP. Our data show that attenuated B2C consistently up-regulated the expression of these chemokine genes. SHBRV, on the other hand, showed little up-regulation of chemokine expression. These results further demonstrate that the wild-type RV evades the body's innate immune response whereas attenuated RV activates them.

Morphogenesis of the Rat Cerebellum
Patrick G. Pilie
Dr. Alexandra Joyner, Skirball Institute, New York University School of Medicine

The cellular composition of the cerebellum is conserved throughout all vertebrates, and the five major cell types are present in all regions of the cerebellum. The cerebellum is made up of three distinct layers including: the molecular layer, the Purkinje cell layer, and the granular layer. Four fissures initially divide the cerebellum into five cardinal lobes that further divide and become ten distinct lobules. Using histological and immunohistochemical markers we studied the regional changes that occur during foliation in the developing rat cerebellum. Cresyl Violet stains the nuclei of all cells and was used as a counter stain on the 7-10mm cerebellar sections while the Purkinje cells, granule cells, and glial cells were stained using the antibodies Calbindin, Kip1/P27, and GFAP respectively. Sections of cerebellum from various ages of rats were used in this study including embryonic day 20, postnatal day 0, postnatal day 4, and postnatal day 6. Interestingly, regional differences in the phenotypes of Purkinje cells, granule cells, and glial cells can be seen as early as embryonic day 20 while the cerebellar cortex still maintains its smooth, unfolded appearance. When comparing lobe 3 to lobe 5 at various stages in development, striking differences can be seen in Purkinje cell and granule cell organization and maturation as well as in the protein expression patterns of calbindin, Kip1/P27, and GFAP. This study provides an evolutionary perspective on what is being conserved during cerebellar foliation when comparing the rat and mouse cerebellum on the cellular and molecular level; and this study shows that each of the five cardinal lobes of the cerebellum takes on a unique identity and unique time of maturation based on characteristic protein expression patterns and cellular morphology.

NADH/Flavoprotein Imaging of the Zebrafish Lateral Line System
Erika Porter – CURO SUMMER FELLOW
Dr. Charles Keith, Department of Cellular Biology, University of Georgia

The purpose of this research is to develop a noninvasive method that uses the measurement of metabolic load in order to build a three-dimensional reconstruction of the electrical activity of the neurons in zebrafish and neuron-like cells. The method uses a two-photon fluorescence microscope and sensory stimulation to measure the ratio of certain mitochondrial coenzymes across cell membranes. This ratio reveals the metabolic load being placed on the cell during sensory stimulation. The coenzymes NADH and flavoproteins show distinct behavioral patterns of fluorescence during the aerobic respiration that occurs during sensory stimulation. The auto fluorescence of the coenzymes allows the microscope to detect the membrane potential which develops as NADH and flavoproteins enter and leave the cell. With the correlation of a time course, these fluctuations give the ability to quantify a relationship between changes in the metabolic load and in the fluorescence indicators as a measurement of neuronal activation. In these analyses, the input and output of the neurons can be separately identified and can be used to establish a quantitative model of cellular interactions in the sensory neurons.

The Interaction of Geography and Identity in Ruth Klüger's *Still Alive*
Radhika Prabhakar
Dr. Martin Kagel, Department of Germanic and Slavic Languages, University of Georgia

Holocaust memoirs encompass a significant portion of WWII literature and are essential to

our understanding of the details and emotional impact of this genocide upon the persecuted, as well as upon German and Western society as a whole. In studying Ruth Klüger's Holocaust memoir *Still Alive,* I am interested in discovering the influence of geography on the formation of Klüger's sense of identity. *Still Alive* was received with great acclaim when it was originally published in German in 1992, winning, among other accolades, the prestigious Prix Memoire de la Shoah. Audiences were fascinated by its stark, understated portrayal of the Holocaust. Klüger's work is unique in the canon, not only because she is one of few female, widely-known Holocaust authors and was a child during her imprisonment, but also because she writes in what could be considered a revisionist, "post-Holocaust" milieu. Her work therefore provides an unusual perspective on the influence of geography on identity for survivors. I am specifically interested in addressing how Klüger's work relates to the greater body of memoir literature and how within her work the issues of her identity in relation to geography and space, are examined. My initial impressions suggest that Klüger uses places, rather than time periods, as the building blocks of her recollection. Klüger also allows the physical geographic aspects of a place to influence her general intuitions and recollections of that locale. Thus, this study will also allow me to observe whether the interaction of geography and identity is a common thread in Holocaust memoir or if such a relationship is unique to Klüger, due to the circumstances of her childhood, her camp experience, and the social and political context of her writing.

Reforming the Kingdom: Educational, Economic, and Political Change in Saudi Arabia

Tyler B. Pratt, Elizabeth Kirby & Aqsa Mahmud, Roosevelt @ UGA
Dr. Sherry Lowrance, Department of International Affairs, University of Georgia

The U.S.-Saudi relationship has traditionally been dominated by narrow energy interests; in return for Riyadh's continual stabilization of world oil prices, Washington provided advanced weaponry and overlooked the country's turbulent internal affairs. The presence of 15 Saudi citizens amongst the September 11th hijackers and the threat posed by the growing militant Islamist movement demand a harsh reevaluation of the U.S.-Saudi relationship. Alarming trends within Saudi Arabia, including the monarchy's growing political instability, the economy's unstable dependence on oil, a glaring lack of political representation, and an education system that radicalizes Saudi youth, threaten to further destabilize the country and undermine U.S. efforts to combat the worldwide terrorist movement. The situation calls for nothing less than a widespread reform of Saudi society. However, change will not come easily to the Kingdom; power is concentrated in the hands of entrenched interests that profit from the explosive status quo. The prospect of empty promises and token reforms will be appealing but ultimately insufficient. In our paper, we examine the dangers confronting Saudi Arabia and propose a comprehensive overhaul of U.S. policy toward Riyadh. We assert that Washington should use its considerable diplomatic and economic resources to encourage reform in three areas. The Saudi education system must be significantly retooled to prevent the continued radicalization of Saudi youth. Economically, Saudi financial transactions should be subjected to stringent and transparent regulations. Lastly, cautious political reform in the Kingdom should continue, driven by economic and social progress that prepares Saudi society for meaningful decentralization of power.

Differences in Environmental Reporting: China & the United States

Kelly Proctor – CURO SUMMER FELLOW
Dr. Lee B. Becker, Director of Cox Center for International Mass Communication Training and Research, University of Georgia

Although China is rife with environmental problems, government-censored newspapers have not always presented the whole, dirty picture. Now the burgeoning economy is making the country more progressive. Newspapers are more willing to report on the environment—and

sometimes on the government corruption and other problems that may hamper environmental cleanup efforts.

This project charts the environmental coverage of two Chinese newspapers, the progressive *JieFang Daily* and the more conservative *NanFang Daily*, compared with the *New York Times*. During a 15-week period, I analyzed the international news, national news, local news, science, education, opinion, and business sections of these three newspapers. Next, I observed the number of news items, the size of the items, frequency, attitude, and subject.

I found that Chinese newspapers relied overwhelmingly on government sources and reported from government meetings. While the *Times* spoke with government as well, its reporters also spoke with citizens affected by pollution. Its articles were longer and more frequent. Also, Chinese newspapers almost exclusively quoted and praised Chinese officials' progressive plans for environmental cleanup, without reporting conflicting opinions. However, there was slightly more balanced reporting within Guangdong's *JieFang Daily*, which is in a more commercialized zone than Shanghai's *NanFang Daily*, and thus must rely on better journalism (as defined by American standards) to hook readers.

Although these two Chinese newspapers still seemed reluctant to criticize the government in the style of the *New York Times*, this project suggests that with financial incentive from the country's burgeoning consumer class they may be more willing to do so in the future.

Detection of *Babesia microti* in Human Tissue through In Situ Hybridization

Sarah B. Puryear
Dr. Corrie Brown, Department of Pathology, University of Georgia

In the northeastern United States, the emerging tick-borne disease *Babesia microti* is the causative agent of human babesiosis. Ticks of the Ixodes species serve as vectors. The white-footed mouse and meadow vole have been identified as reservoirs. Although traditionally considered a strict intra-erythrocytic parasite, much debate has arisen in recent years concerning a possible extra-erythrocytic phase during the life cycle in the host. In this study, formalin-fixed, paraffin-embedded tissues (liver, lung, and spleen) from five experimentally infected hamsters, one uninfected hamster, and spleen from a confirmed non-fatal human case of babesiosis were examined using a recently developed in situ hybridization assay. Using a digoxigenin-labelled anti-sense riboprobe to hybridize to the 16S-like small subunit of the parasitic rRNA in the tissue samples, the sites of parasite infection were located. *Babesia microti* rRNA was detected in erythrocytes within blood vessels throughout the infected hamster tissues and human spleen. In addition, cytoplasmic staining was noted within fixed macrophages in the hamster livers and spleens and in the human spleen. These results indicate the possibility of a previously unrecognized extra-erythrocytic stage of Babesia microti in the mammalian host.

Scientific Illustration

Courtney Reece
Prof. Gene Wright, Department of Scientific Illustration, University of Georgia

Most often, scientific illustrators use their artwork as visual communication to teach scientific concepts. Although a unique path, I use scientific illustration to blend my passion for art with my interest in science and medicine. It not only allows me to express myself, but also to combine the precision and academics of a scientist with the passion and creativity of an artist. I have always had a strong desire to share knowledge and my art with others, and through this major I am able to accomplish both.

After graduating from Georgia with an interdisciplinary degree in scientific illustration, I plan to attend graduate school to obtain my medical illustration degree. Having an interest in a variety of medical fields, I am excited to have the opportunity to explore each of them in depth. I will be able to study with experts in a range of medical fields, while also exploring new techniques in my artwork. Even more thrilling is the possibility of my illustrations being used to teach scientific concepts to students ranging from elementary school to medical school.

Effect of Trait Anxiety on Explicit Memory for Positive and Negative Words Presented Under Divided and Restricted Attention

Eva B. Reed
Dr. Richard Marsh, Department of Psychology, University of Georgia

The current study investigates memory biases in anxious participants to clarify how anxious participants' memory differs from that of non-anxious participants. A memory bias in high trait anxiety participants for negative words has been demonstrated, suggesting that highly anxious individuals may remember a greater number of negative words versus neutral or positive words (Aureille, 1999; Eysenck & Byrne, 1994). The current study examines the effects of divided attention during encoding on memory in non-anxious and anxious participants through a number identification task completed while studying the target stimuli. This study also utilizes a restricted attention task in the form of a lexical decision task and full attention task in order to establish a negative bias in anxious participants. All memory tests will be completed on the computer. Past research has demonstrated that divided attention during encoding hinders recognition, a measure of explicit memory. The current study will use the State Trait Anxiety Inventory (Spielberger, 1983) to measure the participants' trait anxiety levels and a remember/know/new paradigm to test their memory. The remember/know/new paradigm, a valuable memory test, examines the strength to which an item was encoded, with "remember" representing a stronger encoding experience than "know." Because a negative memory bias for negative/threatening words has been found for anxious participants, the amount of "remember" responses for negative/threatening words should be higher in anxious participants. The division and restriction of attention during encoding should prevent the negative memory bias from occurring and therefore eliminate the higher proportion of "remember" responses in anxious participants.

ATB & the Angel of History: A Case Study of the Dialectic in Trance Music

Tom R. Ribitzky
Dr. Beatrice Hanssen, Department of Germanic and Slavic Languages, University of Georgia

As a subgenre of techno, trance is among the most innovative and integrative forms of music. As an area of study, it is not yet quite so rich. Often dismissed or misinterpreted by researchers or journalists who are far removed from the world of trance, the music and its culture rarely leave the clubs and record stores. Up to this point, no one has been able to successfully fuse a passion for the music with an interest in its theoretical and conceptual basis. In order to identify the musico-historical legacy of trance and where it fits in our society, my research focuses on a particular DJ/Producer (ATB, the only trance artist to have reached the #1 spot on the UK's pop charts) and uses constructs such as aura, the trance, and the "Angel of History" theorized by the German dialectical sociologist Walter Benjamin to analyze ATB's lyrics and how they interact with the music. From the lens of the Frankfurt School, launched by Benjamin and Adorno, the case study will shed light on the

general features of trance music. The goal of this multidisciplinary approach to trance is to examine what exactly trance is, where it came from, and where it is going in terms of academic inquiry.

The Effect of Land Use Strategies on the Functional Diversity of Neotropical Nematode Communities

Russ Richardson – CURO SUMMER FELLOW
Dr. Ronald Carroll, Institute of Ecology, University of Georgia

Managed ecosystems often differ greatly in structure and function from unmanaged ecosystems. Shade-grown coffee resembles tropical forest more than coffee monocultures due to higher plant diversity, consequently supporting greater biodiversity at other trophic levels. The increase in biodiversity is thought to lead to a reduction in pest effects. Coffee is also economically important, being the world's second most traded commodity. The ability to adjust the proportion of plant-feeding nematodes in an organic cropping system without chemical inputs is critical. These nematodes cause a reduction in root structure, leading to yield reduction and crop failure. This study seeks to test the hypothesis that shade-grown organic coffee may be grown with a lower proportion of plant-parasitic nematodes than monoculture coffee. Cropping system samples were taken from a four-year-old garden plot experiment on the Maquipucuna Foundation's Orongo Research Farm in Palmitopamba, Ecuador. Nematodes were identified into five functional groups: bacterial feeders, fungal feeders, predators, omnivores and plant feeders. Plant-feeding nematodes were proportionally more abundant in the coffee monoculture treatment (T5) than in the coffee/plantain polyculture (T1) (T5 avg: 28.5%; T1 avg: 3.3%; α=0.05). Statistical significance was not discovered among predator nematode populations, indicating that they were not directly responsible for lowering plant-parasitic nematode numbers. Soil temperatures in the edge coffee monocultures were significantly higher (2°C) than in the other polyculture cropping systems (α=0.05). Soil temperature seems to play some role in mitigating parasitic nematode infestation, perhaps in combination with other factors such as biodiversity. The results from this short-term study are promising and warrant further investigation.

Analysis of *Mycobacterium shottsii* Pathogenesis Using Zebrafish as a Model System

Rebecca L. Satterfield
Dr. Russell Karls, Department of Infectious Diseases, University of Georgia
(Rebecca Satterfield, Frederick Quinn, Donald Evans, and Russell Karls)

Mycobacterium shottsii, a newly-identified bacterial species, was the most prevalent mycobacteria detected in diseased striped bass (*Morone saxatilis*) from the Chesapeake Bay during an epizootic outbreak in the year 2000. By 16S rRNA sequence analysis, *M. shottsii* was found to be closely-related to *M. marinum*, the cause of skin and soft tissue lesions in fish and human fish-handlers. *M. shottsii* would not likely cause a similar disease in humans due to its inability to grow at human body temperatures. However, this pathogen, like *M. marinum*, has proved devastating to fish-associated industries. In order to identify virulence mechanisms employed by bacterium, zebrafish (*Danio rerio*) were employed as a surrogate host for infection. Our laboratory and others have demonstrated that *M. marinum* bacilli replicate within the phagosomes of fish macrophages in vivo. The studies presented here were designed to determine if *M. shottsii* can also survive and replicate within fish macrophages. An *M. shottsii* strain was engineered to express green fluorescent protein to facilitate detection by fluorescent microscopy. To study the interactions of the bacilli with zebrafish macrophages in tissue, the fish coelomic cavity was first injected with mineral oil to recruit immune cells. Seventy-two hours later, infection was established by injection of 106 to 107 *M. shottsii* into the peritoneum. Twenty-four hours later, host cells from the coelomic cavity were extracted and purified by a 45.5% percoll gradient. Macrophage phagosomes were labeled with a specific

fluorescent dye and fixed with formalin. Preliminary fluorescent microscopic examination of host cells indicated that GFP-labeled bacilli co-localized with labeled phagosomes of some host cells. Since the GFP was not degraded, it suggests that these bacilli survived within host macrophages. Therefore, approaches that target the killing of intracellular pathogens should be applied when designing vaccines or therapies against *M. shottsii*.

Sequence Polymorphisms in the Mismatch-repair (TcMSH2) and Glutathione-S-transferase (Tc52) Genes of *Trypanosoma cruzi* Isolates from United States

Mason Y. Savage
Dr. Michael Yabsley, Wildlife Disease Study, University of Georgia

Trypanosoma cruzi is a vector-borne parasite that infects a wide range of mammals and causes clinical disease in domestic animals and Chagas disease humans. Studies in South America have identified single-nucleotide polymorphisms (SNP) in two gene targets (TcMSH2 and Tc52) which support the existence of two major phylogenetic lineages (Types I and II). These lineages have been shown to differ in their ability to cause clinical disease. Based on previous studies, we hypothesize that these two lineages will be in North American wildlife. In this study, we analyzed the sequences of these two genes from seven isolates of *T. cruzi* from the United States including four raccoons, one opossum, one dog, and one vector (*Triatoma gerstackeri*) and compared them to South American isolates. DNA from each isolate was extracted, and the amplification of two genes was conducted by PCR analysis. The two genes targets, Tc52 and MSH2, were then sequenced and compared to South American isolates to identify any SNP. The MSH2 gene of the raccoon and dog differed from South American strains by three SNP and were of Type II, while the opossum and Triatoma isolates differed by two SNP and were of Type I. For the Tc52 gene, no SNP were identified in the raccoon and dog isolates, while five SNP were detected in opossum and Triatoma isolates. Although several SNP were identified, none resulted in amino acid substitutions in the proteins. These data show that the two major phylogenetic lineages of *T. cruzi* are present in North America, but that there are genetic differences between South American and North American strains. Further studies will characterize the virulence of these genetic variants of *T. cruzi* for laboratory animals.

Determining What Causes Certain Carbohydrates to be Expressed in Certain Cells

Rouhin Sen – CURO APPRENTICE
Dr. Michael Tiemeyer, Department of Biochemistry and Molecular Biology, University of Georgia

Cell-surface carbohydrates play an extremely important role in various cell functions such as cell recognition and adhesion, protein stability, receptor ligation, and transmembrane signaling. Such functions require regulated carbohydrate expression. The mechanisms that determine what causes carbohydrates to be differentially expressed in specific tissues are mostly unknown. To determine the genetic pathways that control glycan expression, we are investigating a carbohydrate known as the HRP-epitope, which is expressed predominantly in the neural tissue of arthropods, including Drosophila. Synthesis of the HRP-epitope requires the activity of at least one synthetic enzyme known as fucosyltransferase. There are four identified fucosyltransferases in Drosophila, FucTA, FucTB, FucTC, and FucTD. By introducing each of the fucosyltransferases into mutant flies that fail to make HRP-epitope we are testing their ability to synthesize the glycan in vivo. FucTA has shown the ability to synthesize HRP-epitope in vitro and in vivo. FucTD transgenics do not rescue HRP-epitope expression in embryos, but the enzyme is expressed in the nervous systems. The effect of FucTD expression in neural and non-neural tissue will clarify its potential role in glycan synthesis and normal development.

Changes in the Synaptology of Corticostriatal and Thalamostriatal Innervation in the

MPTP-treated Monkey Model of Parkinson's Disease

Deep J. Shah
Dr. Yoland Smith, Division of Neuroscience,
Yerkes National Primate Research Center,
Emory University

The key pathological feature of Parkinson's disease is the loss of dopaminergic neurons in a brain structure named the substantia nigra pars compacta (SNc). The loss of these neurons causes numerous morphological and physiological changes in the basal ganglia, a group of tightly interconnected brain nuclei, to culminate in the symptoms of Parkinson's disease (PD). Following dopamine depletion, altered glutamatergic transmission from the cerebral cortex (cortex) and the thalamus induces dysfunction of the striatum. However, the exact mechanisms by which projections from the thalamus contribute to these changes remain poorly understood. To address this issue further, we studied potential changes in the synaptic organization of thalamic and cortical inputs to the striatum in a nonhuman primate model of Parkinson's disease. Recently, the loss of glutamatergic axo-spinous innervation of striatal neurons has been reported in both the rat model of PD (Ingham et al., 1988) and in human PD (Stephens et al., 2005). Because of the traditional view that axon terminals from the cortex form asymmetric axo-spinous synapses, while afferents from the thalamus primarily form axo-dendritic synapses in the striatum (Smith et al., 2004), corticostriatal afferents were thought to be mainly affected in PD. However, data from this project demonstrated that about one-half of all axon terminals from the thalamus also form axo-spinous synapses in the monkey striatum. These findings, therefore, suggested that thalamostriatal afferents forming axo-spinous synapses may also be affected in PD. To explore further the effect of nigrostriatal dopamine depletion on thalamostriatal synaptology, an electron microscopic analysis of the synaptic organization of corticostriatal and thalamostriatal axon terminals in the dopamine-depleted striatum of MPTP-treated monkeys, the gold standard animal model of PD, was used. Results indicated that the density of corticostriatal, but not thalamostriatal, innervation increases in the MPTP state, providing the first neuroanatomical substrate that accounts for the increased glutamatergic transmission in the striatum of animal models of PD. These findings appear paradoxical in light of spine loss reported previously in rodents and human PD. Studies are currently underway to determine the extent of spine loss in MPTP-treated monkeys. Evidence for increased corticostriatal activity in PD paves the path for developing novel therapeutic approaches that modulate specific glutamatergic pathways in PD.

Integrating Computational and Experimental Analysis to Study Transposable Elements (TEs) in *Medicago truncatula*

Deep J. Shah & Paul Ruddle
Dr. Susan Wessler, Department of Plant Biology, University of Georgia
(Deep J. Shah, Paul Ruddle, and Dawn Holligan)

Transposable elements (TEs) are genetic elements that can move (transpose) from one genetic locus to another and, in doing so, frequently increase their copy number. To date, TEs have been found in all characterized eukaryotic genomes where they frequently are the most abundant component. The availability of large quantities of genomic sequences from several eukaryotic species has, in recent years, facilitated the study of TEs. Although several studies in the last decade have provided insight into the impact of TEs on genome structure and organization, many aspects of TE biology are still not well understood. In this study, we analyzed a significant fraction (~100Mb) of the available *Medicago truncatula* (Medicago) genome sequence. Medicago is a member of the Leguminosae family, which includes several agriculturally important crops such as soybean and garden pea. Within the legume family it is considered to be a model organism because of its small genome size (~500Mb), relatively fast generation time (~3 months, seed to seed), and capacity for genetic manipulation including transformation. For the analysis of the Medicago database, we devised bioinformatics strategies,

such as BLAST and RepeatMasker, to identify and characterize a wide variety of TE types and used the output of this computational analysis to develop experimental tools, specifically Transposon Display (a modification of traditional Amplified Fragment Length Polymorphism). Based on preliminary results, we find that Medicago contains all of the classes of TEs found in previous analyses of plant genomes, including transposase encoding elements, retrotransposons, Helitrons and miniature inverted-repeat transposable elements (MITEs). The information generated from this study will facilitate annotation of the Medicago genome as well as the genomes of other legumes and will furnish valuable tools, such as molecular markers, for the genetic analysis of Medicago.

An Exemplary Being: The Prostitute in the Early Plays of Bertolt Brecht

Arthur H. Shockley
Dr. Martin Kagel, Department of Germanic and Slavic Languages, University of Georgia

Prostitution is an unavoidable image in the early works of the German playwright Bertolt Brecht (1898-1956). The female population of his early plays is comprised of women who, even if they are not explicitly prostitutes, are bought and sold in their romantic relationships. My research attempts to determine what purpose the ever-present prostitute serves in Brecht's early works. I analyze two of Brecht's lead female characters for this purpose, Marie of *In the Jungle of Cities* (1922) and Jenny of *The Rise and Fall of the City of Mahagonny* (1930). My analysis of these characters shows that the image of the prostitute fits into Brecht's larger commentary on the commodification of human relations, which he viewed as a given fact of capitalist society. The world of Brecht's early plays is one in which individuals, isolated in their struggle for material survival, inevitably treat each other as objects for their own selfish purposes. It is how his characters negotiate the disconnection between their ideals and the dehumanizing rationality of capitalist society that determines their situation. When Brecht's female characters hold onto an ideal of romantic love and refuse to recognize the practical nature of their relationships, as Marie does, they become powerless. It is only the prostitutes, who acknowledge their sexuality as a commodity and are willing to use it as such, that hold any control over their situation, as in the case of Jenny. By fully embracing the capitalist ethos, Brecht's prostitutes absurdly become exemplary, attaining a level of self-determination rare in his early plays.

Cloning, Expression, and Verification of *Pyrococcus furiosus* Protein, PF1476

Anjali Shroff
Dr. Robert Scott, Department of Chemistry, University of Georgia

Transcriptional regulation is one mechanism whereby the expression of various genes in an organism can be coordinated in response to various environmental factors and the needs of an organism. In the archaeal domain of life, the mechanisms of transcriptional regulation are not fully understood. Studies in this area could have important research and industrial applications such as providing proteins and enzymes functional at higher temperatures. This investigation seeks to characterize a potential transcription factor that could regulate the expression of genes in the archaeon *Pyrococcus furiosus* in response to cold shock. The protein of interest is encoded by the gene PF1476, a member of the PadR-like family which includes the PadR protein, a bacterial transcriptional regulator. PF1476 protein (PF1476p) was previously identified from cell extract by a pull-down assay using the promoter of PF1479, a gene determined to be regulated during cold shock by microarray analysis. A plasmid containing recombinant PF1476 with an N-terminal histidine tag was transformed into *Escherichia coli*. Then, protein expression was verified using sodium dodecyl sulfate polyacrylamide gel electrophoresis and mass spectrometry. Finally, a culture was grown for large-scale protein expression, and cell extract was prepared for a Fast Protein Liquid Chromatography procedure in order to purify the expressed protein. Since PF1476p had a histidine tag, a nickel affinity column was used to purify it from the *E. coli* cell extract. Future

studies will include an electromobility shift assay, which will determine if the protein binds to the promoter DNA, and characterization of the potential transcription regulator.

Johnny Cash, Mythology, and the Possibilities of Experimental Historiography
Matthew R. Smith
Dr. Steven Soper, Department of History, University of Georgia

Microhistory uses a variant of the Scientific Method to explore how a historical problem can be solved through an attention to detail. Like scientists, microhistorians do not automatically assume that one diagnosis is better than another. A set of incoherent narratives or cultural meanings often arises after researching an event. Such narratives materialize from the careful interpretation of primary sources, wherein the microhistorian assumes a detective-like role, sifting through artifacts to better understand cause-and-effect. Each narrative or strain of cultural meaning is researched in time, until the microhistorian determines what social or cultural impetus drove a certain mode of historical understanding. Microhistorians discount the type of intellectual shortcuts and broad-stroke generalizations sometimes used by biographers or historians. Microhistorians are not indicting conventional historians or biographers, though; rather, their primary purpose is to show how conventional histories often speculate on how people fit into the larger structure of society. Johnny Cash's life serves as a good example of how history and biography often create an imbalance between a man's real life and the way history evaluates his legacy. In researching the reactions to the Folsom concert of January 1968, I have concluded that the Folsom live performance was both spontaneous and unique. By focusing on one event in Johnny Cash's life, I will show how certain historical truths are more evident when the scale of observation is smaller. The Folsom event allows microhistorians to analyze a well-chronicled event, without the mythmaking and hindsight revision often present in contemporary historical narratives.

Drawing & Painting
Samuel Stabler
Prof. Joseph Norman, Department of Drawing and Painting, University of Georgia

My work is an assimilation of the many things that I experience day to day, from the mundane to the extraordinary. The subject, imagery, color palette, and techniques come from things I have observed. I have had the fortune to spend time in Italy, central Europe, and Cuba. It is primarily from these travel experiences that I have found the content that drives my work. I am inspired by the deep greens of the Cuban rainforest and the pastels of Caribbean architecture. I documented the vibrant earth tones of Italy and the countless shades of gray from the cities of Eastern Europe. I sketch the lines in the architecture and the textures of the land as I move from place to place. In every location, I seek out the local artists. My subject matter is sparked by the many people I meet. Most importantly, I notice subtle cultural differences and how that might define me and my own beliefs.

Grandma Wobbly's Olde Fashioned Fudge Shoppe

Angela Still
Dr. Judith Ortiz Cofer, Department of English, University of Georgia

I have always had a fascination with magic, with other worlds, liminal spaces. I used to dream of slipping off sideways into a parallel universe, tumbling out of my bed and landing in Nod, of doing an Alice down the rabbit-hole. Most people will tell you that their favorite childhood memories revolve around a special birthday, or a favorite pet, or a well-tramped vacation spot. My favorite childhood memories tend to lean more toward exploring that strange, secret garden just off Misselthwaite Manor, or walking headlong into an old wardrobe hidden in a dusty attic space, or crying over the death of a wise old spider.

Almost all of the books I dearly love are, in their own way, magical. Whether about a lonely, pining millionaire on an exclusive island or a hobbit that must save the world, all of the stories that I carry with me take me away from my own world, be it for good or ill. Books are my parallel universe, my rabbit-hole. Somewhere along the way, I decided that I wanted to be the one who told the stories, the one who brought other people along on wonderful adventures into the unknown. I wanted to be the magician. So I turned to the greatest liminal space of all—my imagination—and I started to write.

I am reading a fairy tale called "Grandma Wobbly's Olde Fashioned Fudge Shoppe" about an interesting young lady named Serpetina. She is one in a long line of fudge makers, serving up chocolaty goodness in a tourist town. Each day, she creates a special batch, just for the visitors, though I'm not sure they'll be coming back for more.

Three Republican Archetypes Square Off in North Georgia

Sara E. Swart
Dr. Charles Bullock, Department of Political Science, University of Georgia

The centuries-long political isolation of north Georgia is gradually coming to an end. Historically, North Georgians have elected Southern Democrat candidates. As the Georgia Democratic Party moves away from its roots, North Georgians increasingly support the more conservative Georgia GOP, and some of the state's most politically active individuals and organizations are based out of the area. The "Flaggers" are one such case; the group became nationally known in 2001 and usually supports Republican candidates. Nonetheless, Republicans' fate in North Georgia remains undecided, since the influential wealth of suburban Atlanta counties backs priorities radically different from those of North Georgians. An explanation of how North Georgians view certain Republican candidates reveals what's required for political success in the region from both individual candidates and the GOP. The subject of this study is the Republican primary race for the 50th state Senate seat, in which a staunch conservative activist, comparatively liberal lawyer, and gentleman educator battled out two races. This paper explores the reasons for activist Nancy Schaefer's victory in both elections, using sources that best capture North Georgia's political climate, including interviews with candidates, their managers, and influential local figures; state records, especially those regarding finance and election results; and local news outlets' reports on the issues. In conclusion, this study finds that Nancy Schaefer was able to mobilize Republicans' base, Christian conservatives, by casting her opponents as too liberal for North Georgia on the hot issues of the campaign. Future key issues in North Georgia politics are also discussed.

The Case for Increased Federal Funding of Embryonic Stem Cell Research

Christine E. Tarleton – CURO APPRENTICE, Roosevelt @ UGA
Dr. Steven Stice, Department of Animal and Dairy Science, University of Georgia

The debate over providing federal funding for embryonic stem (ES) cell research is shaped by two conflicting ideals: alleviating the suffering of those afflicted with a number of diseases versus safeguarding the value of nascent human

life. ES cells are undifferentiated cells that have the potential to give rise to all specialized cells in the body (i.e. neural cells) and are capable of self-renewal for a prolonged period of time (years). The controversy surrounding these cells arises because they are derived from a group of cells called the inner cell mass in four to five day old human embryos, usually excess or discarded embryos from IVF (in-vitro fertilization) procedures. This paper addresses the moral questions surrounding the controversy as well as the likely benefits of increased federal funding for ES cell research. Specifically, the proposal focuses on the shortcomings of President George W. Bush's 2001 decision regarding federal funding for ES cell research and advocates for the lifting of the ban against using federal funds for research involving ES cells derived from embryos after the August 9, 2001 cut-off date. Passage of The Stem Cell Research Enhancement Act (H.R. 810) would lift this ban, allowing scientists the opportunity to developed new and improved cells that could be used in research and the clinics. At this time, the bill has been passed by the House and is slated to come to a vote in the Senate early this year. Lesser known benefits of government investment in ES cell research such as the creation of new jobs and overall improvement to the US economy are given special emphasis.

Molecular Epidemiology of *Salmonella enterica Typhimurium* on Poultry and Dairy Farms in Georgia

Elizabeth C. Theriault & Jordan Bray
Dr. John Maurer, Department of Poultry Science, University of Georgia

Salmonella colonizes cold- and warm-blooded animals and, with exceptions, exists as an innocuous transient component of the animal's normal flora. In humans, Salmonella causes a self-limiting gastroenteritis in most healthy adults, and life-threatening septicemia in the young and elderly. Many foodborne illnesses associated with this organism have been linked to consumption of meat or eggs tainted with Salmonella. In order to reduce human cases of salmonellosis, it is necessary to better understand the ecology of Salmonella on the farm. *Salmonella enterica serovar Typhimurium* has been determined as a primary cause of salmonellosis and has been isolated from multiple dairy and poultry farms. We determined the genetic relatedness of this *S. enterica serovar* by Pulse-Field Gel Electrophoresis. The PFGE gel patterns were compared to each other within and between the two groups. A greater degree of genetic diversity was observed in bovine isolates compared to the avian *S. serovar Typhimurium* strains. The difference in diversity between these isolates may be attributed to the management and production practices employed in raising the two different animal species. In the case of poultry production, a company owns or controls all aspects of poultry production, contracting with local farmers and providing them the birds, feed, and technical service necessary for raising meat birds. This practice potentially limits birds' exposure to Salmonella and may explain the paucity of strains. In contrast, dairy cow production tends to be individually owned and operated, where animals acquire Salmonella from their immediate environment, and therefore may explain the greater genetic diversity in bovine isolates from multiple dairy farms. Therefore, for dairy farms, an on-farm biosecurity program and possible intervention strategy, e.g., vaccination may prove best at reducing Salmonella. Poultry farms may need to direct methods of prevention and treatment toward preventing vertical transmission of Salmonella from parental genetic stock of birds to the progeny, meat birds slated for consumption.

The Albany Movement: Black and White Perspectives in Albany, Georgia, 1961-62

Courtney M. Thomas – CURO APPRENTICE
Dr. Barbara McCaskill, Department of English, University of Georgia

In December 1961, the sleepy southwest Georgia town of Albany dramatically changed when the black community, discontented with a separate-but-not-equal transportation system and recreational, educational, and social facilities, attempted to desegregate the town. Members of the Southern Christian Leadership Conference (SCLC) and the Student Nonviolent

Coordinating Committee (SNCC), two organizations that worked for equal rights for people of color, traveled to Albany to assist the local blacks. These efforts became known as the Albany Movement. The demonstrations against segregation in Albany lasted for nearly nine months and attracted the involvement of prominent Civil Rights leaders such as the Rev. Dr. Martin Luther King, Jr., Ella Baker, and Ralph Abernathy. Yet the stand-off ended in August 1962 with no concessions for the town's black citizens. My presentation will focus on my role this year in creating a pedagogical website about the Albany Movement, as a student member of The University of Georgia's Civil Rights Digital Library Initiative. After discussing the Initiative's history and its goals to support research and instruction on the Civil Rights Movement, I will share my research on the differing perspectives of Albany's black and white citizens toward the Movement. I will illustrate my talk with quotations from newspaper articles in 1961-62 issues of *The Albany Herald* and *The Albany Times*, as well as news footage of demonstrations by protestors during the Albany Movement and interviews with prominent figures in the Movement. My research on the Albany Movement proves significant because it focuses on the forgotten civil rights movements in southern Georgia which are often overshadowed by the civil rights activities that occurred in the Atlanta area.

NIRS Detection of Brain Activity During Low Intensity Exercise

Jenna L. Thomason
Dr. Kevin McCully, Department of Kinesiology, University of Georgia

Brain activity has previously been mapped using expensive techniques such as fMRI and PET. Recent studies have suggested that near infrared spectroscopy (NIRS), a noninvasive and relatively inexpensive technology, can also be used to detect brain activity. The aim of this study was to determine if NIRS is useful for detecting brain activity during either exercise or a cognitive task. The experimental subjects were assigned to one of two conditions: (1) low-moderate intensity cycling on a stationary bike while undergoing cycles of on/off cognitive activity (using a cog task), or (2) a sub-maximal one arm hand grip exercise. In each condition, two eight channel probes were secured on the subject's head; the device emits low power light which is scattered by the brain tissue. Differential absorption of light by HbO2 and Hb was used to identify brain activity. Increases in oxygen saturation were interpreted as increases in blood flow and thus increases in regional brain activity. Preliminary results suggest that the NIRS device can detect cognition. If confirmed, the results of this experiment could result in a simpler, more cost-effective and noninvasive way of detecting brain activity in comparison to currently accepted methods.

Development of a Trypsin Assay in a Permeabilized Cell System to Characterize the Luteinizing Hormone Receptor Induced Activation of G-Proteins

Dan W. Thon
Dr. David Puett, Department of Biochemistry and Molecular Biology, University of Georgia

Certain mutations in the human luteinizing hormone receptor (hLHR), a G-protein coupled receptor (GPCR), are believed to cause a constitutive activation of the Gα-subunit of the stimulatory G-protein signaling pathway (Gαs). The stimulatory G-protein signaling pathway is activated by hLHR due to binding of the ligand, luteinizing hormone (LH), which is secreted by the pituitary gland and is essential to normal sexual function. The constitutive activation of the Gs pathway in the absence of ligand creates various reproductive pathologies such as precocious puberty in boys. The nucleotide bound state of the Gα-subunit changes during activation from the inactive, GDP-bound state to the active, GTP-bound state. This study utilized an assay exploiting trypsin's ability to selectively digest the inactive conformation over the active conformation of the Gα subunit to characterize the mechanism(s) of Gαs activation by native and mutant hLHRs through monitoring the nucleotide bound state of Gαs. A membrane permeabilization step was added to the assay in order to allow reagents to interact with intracellular proteins of the HEK-293 cells,

which were transiently transfected with hLHR, to prevent the uncoupling of hLHR from Gs. A toxin produced by Streptococcus pyogenes, Streptolysin O (SLO), creates large pores (~35nm) in the plasma membrane in a controlled and reproducible manner. The use of a SLO permeabilized cell system during the adaptation of the trypsin assay may allow for a better characterization of how mutations in the hLHR cause a constitutive activation of the Gs signaling pathway, and consequently, reproductive pathologies in humans.

Analyzing the Effects of Pectin Degrading Enzymes and Their Inhibitors on the Neurological Development of Drosophila

Annie Tran – CURO APPRENTICE
Dr. Michael Tiemeyer, Department of Biochemistry and Molecular Biology, University of Georgia
Dr. Carl Bergmann, Complex Carbohydrate Research Center, University of Georgia

The glycosaminoglycan moieties of proteoglycans modulate the growth, differentiation, and function of cells in animals. Glycosaminoglycans (GAGs) provide structural support and influence cell signaling events in many tissues. In addition, neural development and the maintenance of normal neural architecture are both sensitive to GAG-dependent signaling pathways. In comparing the enzymes used to degrade GAGs, structural similarities were found with the enzymes used to degrade pectins. Pectins are acidic polysaccharides that constitute a major component of plant cell walls. Anecdotal evidence suggests that pectins have medicinal benefits for human health, although the relevant mechanisms are unknown. Recently it was shown that the three-dimensional structure of some endopolygalacturonases (EPGs, a class of pectin degrading enzymes) are similar to those of chondroitinases (a type of GAG degrading enzyme). Therefore, we hypothesized that pectin degrading enzymes may interact with GAGs in animal tissues, perhaps interfering with normal GAG-dependent cell signaling activities. To test for potential GAG-EPG interactions in vivo, an endopolygalacturonase and a polygalacturonase-inhibiting protein were subcloned into a Drosophila transformation vector that places transcription of the enzyme or enzyme inhibitor under control of an inducible promoter (UAS element). By mating transformed progeny to Drosophila strains that express induction factors (Gal4) in specific tissues, the effect of altered GAG activity on tissue development will be assessed. Because of the sensitivity of normal neural architecture to GAG-dependent signaling pathways, our initial disruption studies have focused on axon pathfinding defects in the embryonic nervous system.

Testing the River Continuum Concept in Sub-Antarctic Streams

Amy E. Trice
Dr. Amy Rosemond, Institute of Ecology, University of Georgia

The river continuum concept's (RCC) basic premise is that energy inputs and other abiotic properties vary along a stream gradient with predictable consequences for biota and ecosystem processes. However, the application of the RCC in particular situations has been refuted, given the inherent differences of ecosystems compared to the Eastern Temperate Deciduous Biome, where the idea was developed. Knowledge of streams in the temperate forests of southern South America is extremely limited, which has limited its incorporation into general explanations, such as the RCC that try to summarize important ecological processes. Therefore, we undertook to describe a longitudinal pattern of benthic invertebrates in the Cape Horn Biosphere Reserve, Chile (55°S) to see if a Sub-Antarctic River Continuum exists. Streams in this biome extend from sea-level to above tree line in short, steep catchments, which are therefore expected to be less predictable along a continuum, and rather more influenced by physical disturbance. To test this hypothesis aquatic macroinvertebrates were collected along an altitudinal gradient from sea-level to headwaters to describe species richness, abundance, composition, functional feeding groups, and biomass. The Robalo River did not follow the overall RCC predictions. Species richness and

biomass did not vary along the gradient. Functional feeding groups were also uniform through, with the exception that shredders did not occur above tree line (above 470 m). Our findings showed that sub-Antarctic stream benthos contained a large number of generalist species found throughout the stream reach.

Effects of Nitrate Contamination on Leaf Breakdown in a Stream at the State Botanical Garden of Georgia

Christy M. Turner
Dr. Sue Eggert, Department of Entomology, University of Georgia

Groundwater contamination from the University of Georgia swine farm has resulted in nitrate concentrations consistently exceeding 15 mg/L in a small stream at the State Botanical Garden of Georgia. The effects of the high nitrate levels on ecological functioning in streams at the Botanical Garden are unknown. Breakdown rates of leaf species typically categorized as having fast (*Liquidambar styraciflua*), medium (*Acer rubrum*), and slow (*Quercus rubra*) rates of breakdown were measured in a nitrate-contaminated stream and nearby reference stream (nitrate <1 mg/L) during the winter of 2005 to test the hypothesis that leaves placed in the nitrate-contaminated stream would have faster breakdown rates than leaves placed in the reference stream due to the nitrate's nutritional enrichment of leaf matter to the microbial and macroinvertebrate organisms that break it down. Preliminary data showed a mixed response in leaf breakdown rates between the two streams. *Liquidambar styraciflua* leaves broke down faster in the nitrate-contaminated stream compared to the reference stream, while *Quercus rubra* leaves broke down faster in the reference stream. *Acer rubrum* breakdown rates were similar between streams. My data show that elevated nitrate levels affect and may negatively impact the breakdown rates of some leaf species, as well as the overall health of the stream.

Trans-sialidase Specific $CD8^+$ T Cell Responses in *T. cruzi* Infection of Balb/C Mice

John (Jake) E. Turrentine, Jr.
Dr. Rick Tarleton, Department of Cellular Biology, University of Georgia

Trypanosoma cruzi, the causative agent of Chagas' disease, afflicts approximately 18 million people throughout Latin America. In both human and mouse models, peptides of the trans-sialidase (ts) gene family of *T. cruzi* have been identified as important targets of $CD8^+$ cytotoxic T cells in *T. cruz*i infection. Infected C57BL/6 mice develop strong and focused $CD8^+$ T cell responses to a few ts-derived MHC-I epitopes. However, in infected humans, the $CD8^+$ T cell response to ts peptides is lower and appears to be less restricted. To determine if the strong and focused response in C57BL/6 mice is also evident in other mouse strains, especially those strains exhibiting greater susceptibility to *T. cruzi* infection, this project examined immune responses in the Balb/C mouse strain.

Enzyme-linked immunoSPOT assays and in-vivo cytolytic T lymphocyte assays have been used to probe for immunogenic *T. cruzi* ts-derived peptides in Balb/C mice from a screening of ten predicted MHC-I binding peptides. One peptide, TSKD-14.1, elicited a focused immune response in the Balb/C mice. In recent intracellular cytokine staining experiments, the strength of the $CD8^+$ T cell response to TSKD-14.1 has been shown to vary according to infecting parasite strain. To determine whether there are other immunogenic ts peptides in Balb/C mice, future ELISPOT and in-vivo CTL assays will survey an additional pool of ts peptides selected on the basis of MHC-I binding affinity predictions and *T. cruzi* genomic data. By exploring the ts peptide response in Balb/C mice and other mouse strains, we hope to determine whether resistance to *T. cruzi* infection correlates with the magnitude of the ts-specific $CD8^+$ T cell response.

Identification of Transcription Factors that Bind to WhiB3 Promoter in Mycobacterium Tuberculosis

Katrin Usifo

Dr. Joel Ernst, Department of Microbiology,
New York University Medical School

Mycobacterium tuberculosis is a global health threat that takes a life every fifteen seconds. Mycobacterium tuberculosis whiB3 is a postulated transcriptional regulator whose expression is markedly increased in bacteria isolated from the lungs of mice compared to bacteria grown in broth culture. WhiB3 expression peaks early after infection of mice, then decreases. In vitro experiments show that the whiB3 transcript is induced in aerated conditions compared to hypoxic cultures. The purpose of this project is to use Electrophoretic Mobility Shift Assay (EMSA) to determine whether transcription factors bind to whiB3 promoter under transcriptionally induced and repressed conditions. Reverse Transcriptase PCR was performed to determine the transcriptional start site of whiB3 and thus identify the promoter region. RT-PCR results confirmed the putative transcriptional start site of whiB3 at ~ –102 base pairs. EMSA was performed with four different regions of the promoter and proteins isolated from bacteria grown in broth in aerated and hypoxic conditions. EMSA results showed gel shifts under both aerated and hypoxic conditions. Binding patterns differed based on transcriptionally inducing and repressing conditions. However, binding patterns were the same with different regions of whiB3 promoter sequence. Although duplexes could out-compete each other, unrelated non-TB DNA and DNA from a coding region of another gene (acr) could not out-compete labeled duplexes. These results suggest that DNA-binding proteins under aerated and hypoxic conditions bind to whiB3 promoter. The specificity of DNA-protein interactions for whiB3 promoter remains to be determined.

Emotion, Identity, and Cardiovascular Response

Alexander Watts
Dr. Dawn Robinson, Department of Sociology,
University of Georgia

Contemporary sociological theories of identity make conflicting predictions about the relationship between identity disruption (i.e. the discrepancy between an outside observer's assessment of one's identity versus one's own views) and the valence of emotion. Identity control theory predicts that all identity disruption leads to negative emotion. Affect control theory, in contrast, predicts that negative identity disruption leads to negative emotion, while positive identity disruption leads to positive emotion. A critical test of these competing predictions would require measures that separately measure positive emotion, negative emotion, and identity disruption. This research will review the literature on the self-report and physiological measures of emotion and present the results of an experiment designed to independently manipulate positive and negative identity disruption. A sample of University of Georgia undergraduate students will participate in an IRB-approved experiment in which they receive positive and negative feedback in response to a social performance. Participants' views of their own social competence will first be assessed using the short form of the Texas Social Behavior Inventory. Research participants will then give a brief prepared speech, ostensibly to two unseen raters. Participants will be randomly assigned to subsequently receive feedback that is either (1) highly negative or (2) highly positive, or (3) to receive no feedback. Skin temperature, skin conductance, skin resistance, and peripheral blood flow will be measured through a skin temperature probe, Galvanic Skin Response electrodes, and an infrared plethysmograph and will be used to index both the type and magnitude of emotional response to the feedback. The devices for measuring physiological responses are relatively unobtrusive, so acclimation to the equipment is not necessarily critical. The subjects will, however, be given a moment to adjust during a brief seeing test before their performance. Self-views of competence will be crossed with the nature of the feedback to distinguish between those whose positive identities have been disrupted, whose positive identities have been confirmed, whose negative identities have been

disrupted, and whose negative identities have been confirmed. The self-report and physiological measures of emotion and identity disruption will then be used to distinguish between the predictions of identity control theory and affect control theory.

An Emerging International World Order: The Case for Mandatory Foreign Language Proficiency within the United States Public School System

Daniel J. Weitz, Roosevelt @ UGA
Dr. Linda Harklau, Department of Language and Literacy Education, University of Georgia

Both historically and within present times, the United States has maintained the English language as its unofficial yet universal channel of communication. While emphasis upon a central conduit of dialogue befits the interests of any nation, modern society has progressively become interdependent in many aspects of human existence, and, as such, the language barrier oftentimes poses a significant obstacle to cross-cultural cooperation. In refusing to allow modification and thus modernization upon the status quo of communicative expression within the United States, hindrances relative to economic interests, societal tolerance and understanding, and overall political cordiality among international counterparts have correspondingly emerged with the United States' failure to evolve with the progression of an internationally oriented state of mankind. This paper illustrates how the United States, existing among the world's foremost international actors, would greatly benefit economically, socially, and politically from the implementation of a mandatory foreign language curriculum throughout the national public school system, as this adaptation would support the United States' potential leadership stature within the emerging international world order.

Improving Ultrasound Arterial Assessment by Standardizing Probe Selection and Optimization Settings

Cary F. West & Danielle Morozewicz
Dr. Kevin McCully, Department of Kinesiology, University of Georgia

Ultrasound technology is widely used to make assessments of arterial function. However, the accuracy of these assessments has been called into question. A proportion of this variability may be controlled through standardizing measurement protocols. Therefore, the aim of this study was to assess variability due to probe selection and optimization settings. Ten healthy 20-26 year old male and female subjects were tested. Brachial artery size (diameter) was measured thirty times a second using a B-mode Ultrasound unit equipped with a high-resolution video capture device. To assess variability due to probe selection and optimization, we manipulated three parameters: 1. probe frequency; 2. measurement location; and 3. image display size. To assess variability due to probe selection, we compared three probes. To assess intersession variability, we continuously made recordings for twelve minutes, with the probe being removed and re-positioned between each four-minute duration. Coefficients of variation for probe frequency, measurement location, image display size, and probe selection were 2.2%, 2.2%, 1.1%, and 3.9%, respectively. Intersession variability was 4.0% while using constant probe and optimization settings. In conclusion, the optimization setting most likely to decrease reliability is probe selection. However, as long as probe selection and optimization settings are kept constant, our intersession variability shows that reliable measurements can be made.

Analysis of Interactions between EPGs/PGIPs/Pectins Using Surface Plasmon Resonance

James M. Wheeler
Dr. Carl Bergmann, Complex Carbohydrate Research Center, University of Georgia

Endopolygalacturonases (EPGs) are important fungal pathogenicity factors and are among the first enzymes secreted when fungi are grown on isolated plant cell walls as a sole carbon source. As a defense against fungal attack, plants produce proteinaceous EPG inhibitors known as

polygalacturonase-inhibiting proteins (PGIPs). PGIPs are soluble, leucine rich repeat (LRR) glycoproteins, found in the extracellular matrix of most plants. PGIPs may form high-affinity complexes with EPGs in a reversible, stoichiometric manner. The mode of action of a particular fungal EPG and its inhibition by PGIPs may be critical factors in determining whether the fungus is a viable pathogen. To fully understand the interactions of these two classes of molecules and their role in host-pathogen interactions, the mode of action of EPG hydrolysis and of PGIP inhibition must be understood at the molecular level. Pectin is the natural substrate for EPGs, and our research and that of others indicates that the pectin binds both the EPG and the LRR inhibitor PGIP. This implies that pectin plays an active role in the formation of an EPG/PGIP/pectin complex and is not simply a passive substrate. This has major implications in understanding the role of this ternary EPG/PGIP/pectin in pathogenesis, as well as understanding the role of glycosaminoglycan/LRR/receptor complexes in animals. These interactions are studied through surface plasmon resonance (SPR) using EPGs from various fungal sources and site directed mutant PGIPs. SPR is also used to look at the interaction of PGIPs with pectins, as well as the effect of pectins on EPG-PGIP complexes.

A Tangled Topic: The Connect Sum of Mathematical Knots

Rachel E. Whitaker
Dr. Jason Cantarella, Department of Mathematics, University of Georgia

Mathematical knots are closed, three-dimensional curves that cannot be distorted to produce the unknot, a simple loop. They are categorized by their minimal crossing number, or the fewest number of crossings possible after distorting the knot to its simplest form. Knots which can be expressed as a joining, or connected sum, of other knots are called composite; otherwise, the knot is prime. Knot theory has many applications to the biological sciences, including the modeling of DNA and protein folding. One of the most prominent questions in knot theory is deceptively simple: determining whether two knots are equivalent. The VIGRE [Vertical Integration of Research and Education] Geometric Knot Theory group has been working to create a library of all knots with relatively low crossing number. While libraries exist to classify prime knots, one including composite knots would be beneficial. However, there is no distinct way to join any two knots; the knots' reversible, mirror, and amphichiral symmetry affect which composite knot is formed. Therefore, computer programs are necessary to test aspects of the symmetry of knots in order to compare them and determine equivalency. Our program, written in the C programming language, reverses the orientation of a knot or any number of specified components in a link (a collection of knots). Subsequently, our programs to convert the format of knots between VECT and Fe formats allow us to utilize Brakke's Evolver program to generate proportional representations of the connected sum knots for the library that are visually appealing.

Reconstructing Maginot: Missile by Missile

Adam P. Williams, Roosevelt @ UGA
Dr. James Holmes, Center for International Trade and Security, University of Georgia

Just over three-quarters of a century ago, the French senate approved the construction of the largest defensive structure the Western world has ever known. Although its shortcomings tend to be overstated, the series of concrete fortifications envisioned by War Minister André Maginot not only failed to prevent a German invasion but also served to cripple France's foreign policy altogether, ensuring France would be ill-prepared for the looming Nazi blitzkrieg. Today, critics accuse the United States of constructing its own, modern Maginot Line, only with rocket fuel and guidance chips replacing concrete and barbed wire. National missile defense—a program that has existed in varying forms since the 1960s—has, many political changes notwithstanding, remained a fixture of America's long-term strategic thinking. Consuming the largest single portion of the Defense Department's acquisition budget (some $8.8 billion for fiscal year 2006), national

missile defense has become a top priority in the United States' approach to countering the growing threat of nuclear, chemical, and biological weapons. Despite the tenuous consensus in Congress regarding missile defense, many still question the strategic worth, not to mention the feasibility and cost-effectiveness, of this so-called "star wars" system. The paper will analyze the strategic value of missile defense systems against some feasible alternatives aimed to mitigate the risks posed by weapons of mass destruction. Then, by approaching missile defense through the eyes of history, it will determine whether America's 21st century bulwark is doomed to share a fate similar to that of its infamous French predecessor.

Development of Transgenic Zebrafish to Understand the Role of Hyal-2 in Tumor Formation

Dustin Williams – CURO SUMMER FELLOW
Dr. Scott Dougan, Department of Cellular Biology, University of Georgia

Jaagsiekte sheep retrovirus (JSRV) is an infectious virus that encodes an oncoprotein that induces ovine pulmonary adenocarcinoma by transforming lung epithelial cells. This cancer shows similarities with bronchioloalveolar carcinoma in humans, a cancer not strongly associated with smoking. The oncoprotein is the virus envelope protein (ENV). The receptor for this protein is Hyal-2, a membrane protein of undetermined function. Hyal-2 is deleted frequently in human lung tumors, opening the possibility that it functions as a tumor suppressor. Currently there are few genetic model systems in which to study the role of Hyal-2 in oncogenesis. To study this problem, ENV will be overexpressed in zebrafish using the GeneSwitch system from Invitrogen. The system consists of two plasmid vectors, pSwitch and pGene. The pGene vector contains the gene to be expressed. PSwitch encodes a transcription factor, the GeneSwitch protein, which binds to pGene, resulting in the expression of the gene of interest. However, the GeneSwitch protein can only activate transcription in the presence of the drug mifepristone. Thus, gene expression can be induced ubiquitously at any stage of development upon addition of mifepristone. Traditional methods of introducing genes into fish yield low transfection rates of 1-5%. Instead, a transposon system will be used to insert ENV. Transposons containing the pSwitch and pGene-ENV constructs will be coinjected into early embryos with transposase mRNA, which will mediate integration randomly into the genome. This method yields significantly higher transfection rates of up to 50%. After the constructs are injected, the fish will be screened for tumors. If tumors are found, a variety of opportunities will be opened to study tumorigenesis and will allow use of zebrafish as a genetic system to dissect the role of Hyal-2 in tumor formation.

Beta-amyloid Immunoglobins as a Potential Early Marker for Alzheimer's Disease

Jennifer S. Wilson
Dr. L. Stephen Miller, Department of Psychology, University of Georgia

Recent developments in Alzheimer's Disease (AD) research show that certain immunoglobulins (IgG) circulating in the bloodstream may mark the presence of the amyloid plaques that characterize the progression of this disease. Gathering at receptor sites for advanced glycation end products (RAGE), amyloid peptides accumulate over time within cortical areas of brain tissue. Plaques formed in this process are associated with impairment of cognitive functioning such as memory and decision-making. In response to the increased presence of amyloid ABeta proteins and RAGE cells, data suggest an increase in levels of anti-RAGE and anti-ABeta IgG. Because this natural immune response can be observed in a simple blood sample, many of the previous limitations in diagnosing AD can be reduced. Current methods of diagnosis, such as neuropsychological testing or MRI scanning, are expensive, time-consuming, and can often only detect the disease in its later stages. This study examines the relationship between the levels of anti-Ab and anti-RAGE IgG biochemical markers, and changes in cognitive functioning over time. Levels of the IgG markers in blood

plasma samples were compared with test scores from the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS). The purpose of the study was to determine which domains of cognition tested by the RBANS best correlated with concentration of the biological blood markers. Establishing correlations between the RBANS, and anti-ABeta and anti-RAGE IgG will help to explain differences in specific IgG levels within groups of individuals diagnosed with AD. This will further define the role of IgG blood sampling as a potential predictive method for identifying the disease and may help to establish a stratified approach to classifying individuals with AD, thus allowing treatment to be better tailored to the needs of each patient.

Genetic Manipulation of *Actinosynnema pretiosum*.

Charles Wooten – CURO SCHOLAR
Dr. Janet Westpheling, Department of Genetics, University of Georgia
(Charles Wooten, Brandan Hillerich and Janet Westpheling)

Actinosynnema pretiosum is a soil bacterium that produces the maytansinoid, ansamitocin, an important anticancer chemotherapeutic agent. Maytansinoids are effective antitumor agents derived from plants and microorganisms. Very little is known about the biosynthetic pathways that lead to their synthesis. *Actinosynnema pretiosum* is a member of the family of bacteria called actinomycetes. These Gram positive filamentous soil bacteria make most of the natural product antibiotics used in human and animal health care including a number of anticancer therapeutics. *Actinosynnema pretiosum* ssp. auranticum is an uncharacterized member of this family of bacteria and is particularly unresponsive to conventional genetic analysis. In fact, many of the tools developed for genetic manipulation of the model organism in the group, *Streptomyces coelicolor*, do not work in this strain. In an effort to develop genetic tools to manipulate the strain and to engineer the pathway for ansamitocin biosynthesis, we will test a number of plasmids and insertion sequences from *S. coelicolor*. Here we will report the development of protocols for the introduction of these tools into *Actinosynnema pretiosum* with the long term goal of using these tools for mutagenesis (by integration into genes), gene replacement, and the engineering of the ansamitocin biosynthesis pathway for novel antibiotic production.

Identifying IS*492* Chromosomal Insertions in *Escherichia coli*

Lanelle D. Wright
Dr. Anna Karls, Department of Microbiology, University of Georgia

Pseudoalteromonas atlantica, a Gram-negative marine bacterium, produces extracellular polysaccharide (EPS), to which other marine organisms attach in the formation of biofilms on solid surfaces. EPS production is turned off and on and by MooV-mediated insertion and excision of the mobile element IS*492* at the *eps* gene. In *P. atlantica* IS*492* appears to insert specifically into one site within the *eps* gene. This study asks what is the specificity for IS*492* insertion in a naïve host, *Escherichia coli*. Studying IS*492* insertion in *E. coli* will provide insight into the mechanisms of DNA recombination by a novel family of DNA recombinases (Piv/MooV family) and will contribute to understanding medically important events associated with DNA recombination, including cancer.

An IS*492* insertion assay in *Escherichia coli* was developed using an IS*492* construct that contains a tetracycline resistance gene (IS*492*Δ*mooV*::*tet*) and an *eps* target plasmid. IS*492*Δ*mooV*::*tet* insertion events into the target plasmid were selected for by isolating *E. coli* strains resistant to tetracycline (Tet^R). Tet^R *E. coli* isolates that did not contain IS*492*Δ*mooV*::*tet* insertions into the *eps* target plasmid were screened for IS*492*Δ*mooV*::*tet* insertions into the chromosome using Polymerase Chain Reaction (PCR) designed to amplify the chromosomal DNA that border IS*492* insertions. The PCR protocols were optimized for specificity by changing primers, altering annealing temperatures, and adding dimethyl sulfoxide, but

sequencing of the PCR products from these PCR assays indicated that IS*492*Δ*mooV*::*tet* did not insert into the *E. coli* chromosome. It is possible that there is not an appropriate target site for IS*492* insertion on the *E. coli* chromosome. This will be addressed in future experiments by introducing the *eps* target sequence from *P. atlantica* into the *E. coli* chromosome and then assaying for insertion of IS*492*.

Graphic Design
Jennifer Xin
Prof. Lanny Webb, Department of Graphic Design, University of Georgia

Graphic design involves the use of typography, color, imagery, and concept to organize and deliver content, to elicit a feeling or response appropriate to the client's needs. In my work, I try to achieve a balance between a playfulness that will draw in the viewer and a sense of order to establish a hierarchy of information. The end product should be regarded as effortless and simple. To me, the overall message should never be obscured or overtaken by the artist's own whimsies or stylizations; otherwise it ceases to operate as a vehicle for communication and instead begins to call attention to itself as an end unto itself. Ultimately, my work is about using elements of design in its essence and letting that speak directly without attempting to embellish and clutter with excess.

Urban Sprout is a hypothetical seed company that caters to city-dwellers. It specializes in gardening kits that provide everything one initially needs to start planting. The company's aim is to promote awareness of nature in urban environments. Its main clientele include young professionals, teenagers, and children. I created a business stationary system, seed packaging, and cartons for a gardening kit that is playful and hip.

Effects of Market System Entry on Rural Indigenous Women in Ecuador
Sarah M. Yagoda
Dr. Jose Alvarez, Department of Romance Languages, University of Georgia

Indigenous communities in Ecuador's Andean region were not exposed to significant economic development until the 1980s. Because of the short time that business initiatives have been carried out in the area, limited research has been conducted on how indigenous women's gender and familial roles are affected by "empowerment" projects intended to increase their ability to earn independent incomes. Therefore, this research focuses on some effects of these development programs. This will in turn help to determine the validity of common assumptions about these types of projects, namely that they help women obtain more equality. This research will also explore how equality is defined by the women who are affected by these initiatives, as well as by the people who organize the projects. My research is being conducted in three phases. First, I am reviewing what has already been published in the U.S. and Ecuador on this topic. Second, women who are involved in one economic development project in the region have been interviewed, and I am transcribing the recorded conversations. Third, I will travel to the region from March 5, 2006 to March 17, 2006 to interact with the women involved in the project. Plans are also being finalized to interview representatives from Ecuadorian foundations which work with women's issues and economic development. The data collected so far suggest that economic development programs alter women's traditional roles in ways many women describe as positive, but they can also cause conflicts when male heads-of-household resist their female counterparts' participation in empowerment projects.

Regulation of Branched-Chain Amino Acid Catabolism in *Streptomyces coelicolor*: Applications for Metabolic Engineering of Polyketide Antibiotic Biosynthesis

Fei Yang – CURO SUMMER FELLOW
Dr. Janet Westpheling, Department of Genetics, University of Georgia
(Fei Yang, Karen Stirrett, and Janet Westpheling)

Streptomyces are soil bacteria that produce over 70% of antibiotics used in human and animal health care. Mutants of Streptomyces defective in the catabolism of the branched chain amino acids, valine, leucine, and isoleucine, are also defective in antibiotic production, suggesting that some of the precursors for antibiotic synthesis come exclusively from this carbon utilization pathway. The *Streptomyces coelicolor bkdA2B2C2* gene cluster encodes a putative branched chain amino acid dehydrogenase Complex, and *bkdR*, a leucine response regulator, represses these genes at the level of transcription. The promoter contains a nearly perfect 14bp inverted repeat that may be the binding site of the *bkdR* protein. To examine the regulation of the *bkdA2B2C2* cluster and to investigate the role of *bkdR* in its regulation, a transcriptional fusion between the *bkdA2B2C2* cluster promoter and the *xylE* reporter gene was constructed. Strains expressing *xylE* convert colorless catechol to a yellow oxidation product. The *bkdA2B2C2-xylE* construct was introduced into wild-type *S. coelicolor* M145 as well as the *bkdR* mutant; M145 containing a promoter less copy of the *xylE* gene was used as a negative control. The *bkdR* mutant containing the *bkdA2B2C2-xylE* fusion will be yellow as expression of the cluster in the mutant is constitutive. *bkdA2B2C2-xylE* expression in wild type will be assayed in minimal liquid media cultures with glucose, maltose, mannitol, leucine, isoleucine, or valine as sole carbon source for induction times and levels. In addition, degenerative PCR will be used to generate base changes in the promoter region of this cluster, and *xylE* assays will be used to examine their effect. As a result of this analysis, I hope to gain an understanding of the role *bkdR* plays in the regulation of the *bkdA2B2C2* cluster and identify the environmental signals that induce transcription. This work will contribute to the understanding of the morphogenic pathways that contribute to antibiotic production and their eventual manipulation for novel antibiotic synthesis.

Unraveling the Molecular Basis of the Role of Pectins in Human Health

Stephanie Yarnell – CURO SUMMER FELLOW
Dr. Carl Bergmann, Complex Carbohydrate Research Center, University of Georgia

Glycosaminoglycans (GAGs) are unbranched carbohydrate polymers. They are a component of the extracellular matrix and contribute to the general structure and permeability properties of connective tissues. GAGs have been implicated in binding of pathogens to particular target cells, maintenance of cellular activities, and development of metastasis in cancer cells. Pectins are the primary structural elements of the matrix of the plant cell wall and have been implicated in morphogenesis, pH regulation, ion balance, wall permeability, and plant defense. We noted that microbial enzymes that cleave GAGs and those that degrade pectin share structural similarities, and enzyme structure is often driven by the three dimensional structure of the substrate. The similarity in function of GAGs and pectins, and the structural similarities of the enzymes that degrade them, led us to wonder if these were clues that could shed light on the mechanism of the role of pectins in human health. As a first step, we have used reducing sugar and UV-based assays as well as fluorescence to investigate the effects of GAGs on selected pectin degrading enzymes (PDEs) and of pectin on GAG degrading enzymes. Our data demonstrate that pectins are able to affect GAG degrading enzyme activity, and GAGs are able to affect PDEs. Thus, it is a reasonable assumption that the receptors for GAGs involved in such activities as neural development and tumor development are potential targets for pectins and that the role of the GAGs themselves in development may be altered by PDEs.

The Relationship between Children's Emotional Responses to Puppet Vignettes and their Social Competence

Jessica Zabell, Sara Douglass & Crystal Barber, Georgia College & State University
Dr. Tsu-Ming Chiang, Department of Psychology, Georgia College & State University

Young children's social and emotional competence is closely related to their peer relations. Children who lack understanding of appropriate emotional expressions in social contexts are more likely to engage in conflict and aggressive behaviors. It is thus imperative to seek early indicators of children's social deficiencies. Such indicators would allow early interventions to coach appropriate emotional competence to promote healthy social adjustment and successful interpersonal relations. In the present study, puppet vignettes were used to assess children's ability in recognizing appropriate emotions. The aim of this study is to discern whether children's emotional responses to conflict situations may be related to their social competence rated by their teachers. A total of 121 three-year-olds (boys = 59) from the local Head Start program were recruited to participate in a larger study conducted by Chiang and Zabell, et al (2005, 2006). The puppet vignettes, outlining imaginary scenarios to elicit various emotional responses, were randomly presented to the participant. The conflict vignette involved a child grabbing a favorite toy from the participant. Fifty–three participants whose responses were anger or sadness were used for data analyses. Their responses were correlated with the Teachers' Social Competence Behavior Evaluation (SCBE) rating. Two-Way (2 X 3) ANOVA (Emotion x SCBE) were further used to compare the differences. The results showed that children reporting anger were rated more aggressive and oppositional versus those reporting sadness; children reporting sadness were rated more calm and cooperative versus those reporting anger. More results and implications will be discussed at the conference.

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CURO

Center for Undergraduate Research Opportunities

Symposium 2007

Artwork by Hsuan Ju Susan Fang, CURO Summer Research Fellow

April 9, 2007

Tate Student Center & Student Learning Center

Program and Book of Abstracts

Creating a Culture of Undergraduate Inquiry

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Table of Contents

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Center for Undergraduate Research Opportunities

Symposium 2008

University of Georgia
Tate Student Center & Student Learning Center
April 7, 2008

CALL FOR ABSTRACTS

The Center for Undergraduate Research Opportunities at the University of Georgia provides a forum for all undergraduates to present original research and creative works sponsored by faculty members. Undergraduate students from all disciplines are encouraged to participate. Representatives of public and private higher education institutions in Georgia are encouraged to apply.

Presentations may be in the form of an oral presentation, poster session, exhibition, performance, or work of art. Students can also present a tutorial about a research methodology or new technology. Undergraduate researchers who are at various stages of the research process are encouraged to submit abstracts describing where they are in the research process and the issues they face. Those who wish to present their work should submit an application and an abstract of a maximum of 250 words (via the CURO web site) and a brief supporting letter from the sponsoring faculty member no later than January 18, 2008. Group research projects should be submitted with one application and one letter of faculty support. All abstracts will receive graduate student peer review with faculty guidance. All participants accepted into the Symposium will be notified by February 15, 2008, and their abstracts will be published in a book of abstracts. Sponsoring faculty will be invited to preside at their students' sessions.

Best Paper Awards
Papers on work being presented at the CURO Symposium submitted by March 17, 2008 will be considered for Best Paper awards in the categories of humanities, social sciences, civic responsibility focus, international focus, and sciences. Papers must be submitted electronically to curo@uga.edu. Maximum length is 20 pages, double spaced.

Purpose of the Symposium:
- To highlight excellence in research by undergraduate students
- To enrich the undergraduate experience by promoting communication and cooperation between faculty and students
- To provide a forum for undergraduates to communicate and disseminate their research findings and creative works
- To provide an opportunity for undergraduate researchers in the state of Georgia to engage with their peer researchers

Criteria for Selection:
- Originality and quality of research
- Quality of written abstract
- Ethical and responsible research
- Extent of the undergraduate student's involvement in development of the research design and execution of the project. Research presented at the Symposium should go beyond work completed for a class paper or project
- A letter of support from supervising faculty

This event will be free and open to the public. All interested faculty and students are encouraged to attend the CURO 2008 Symposium. For more information, contact curo@uga.edu, (706) 542-5871.

Monday, April 9, 2007

Begin registration of oral and poster presenters; Students hang up posters — **8:30 a.m.**
Tate Student Center, Lower Lobby

Concurrent Oral Sessions — **9:05 a.m.**
Tate Student Center, Rooms 137, 138, 139, 140, 141, 142

Concurrent Oral Sessions — **10:10 a.m.**
Tate Student Center, Rooms 137, 138, 139, 140, 141

Concurrent Oral Sessions — **11:15 a.m.**
Tate Student Center, Rooms 137, 138, 139, 141, 142

Concurrent Oral Sessions — **12:20 p.m.**
Tate Student Center, Rooms 137, 138, 139, 140, 141, 142

Concurrent Oral Sessions — **1:25 p.m.**
Tate Student Center, Rooms 137, 138, 139, 141, 142

Creative Writing & Dance — **2:00 p.m.**
Tate Student Center, Georgia Hall A

Concurrent Oral Sessions — **2:30 p.m.**
Tate Student Center, Rooms 137, 138, 139, 140, 141, 142, 143, 145

Welcome and Opening Session — **4:00 p.m.**
Tate Student Center, Georgia Hall A
Dr. David S. Williams
Director, Honors Program
Dr. David C. Lee
Vice President for Research
Dr. Arnett C. Mace, Jr.
Provost

Introduction of Keynote Speaker — **Douglas Jackson**
CURO Summer Research Fellow and CURO Scholar

Keynote Address: *"The Researcher and the Wide, Wild World of the Internet"* — **Prof. Conrad Fink**
Josiah Meigs Distinguished Teaching Professor
Morris Chair of Newspaper Strategy & Management

CURO Promising Scholars — **Dr. David S. Williams**
Director, Honors Program

Announcement of Excellence in Undergraduate Research Mentoring Awards

Dr. Arnett C. Mace, Jr.
Provost
Dr. Pamela Kleiber
Associate Director, Honors Program

Poster Session, Reception, and Vendor Market — **5:00 p.m.**
Tate Student Center, Georgia Hall A & B

CURO Apprentice & Promising Scholars Dinner — **6:15 p.m.**
Tate Student Center, Reception Hall

Art Gallery Talks — **6:15 p.m.**
Student Learning Center, Fourth Floor Rotunda

Prof. Georgia Strange
Director, Lamar Dodd School of Art
Ms. Nora Wendl
Gallery Director, Lamar Dodd School of Art

Dessert Reception & Announcement of CURO Summer Research Fellows, CURO Scholars, UGA Libraries Undergraduate Research Awards, and Best Paper Awards — **8:00 p.m.**
Student Learning Center, Fourth Floor Rotunda

Dr. David S. Williams
Director, Honors Program
Ms. Florence E. King
Assistant University Librarian for Human Resources and Director, Student Learning Center
Ms. Deborah Dietzler
Executive Director, UGA Alumni Association

Monday, April 9, 2007

Concurrent Oral Sessions

Tate Student Center, Conference Rooms 137, 138, 139, 140, 141, 142, 143, 145

9:05 – 9:55 a.m. First Concurrent Session

Room 137	**Lauren Coffey**	The Repression of Dissent: Multi-Group Dissident Responses to State Repression in Burma, 1980-2005
	Faculty Mentor	Dr. Stephen Shellman, Department of International Affairs
	Benjamin T. Cobb	The Role of Non-resident Indians in Promoting U.S.-India Strategic Rapprochement
	Faculty Mentor	Dr. Seema Gahlaut, Center for International Trade & Security
	Daniel Weitz	The Legacy of AQ Khan: An Analysis of Illicit Trade Patterns in the Pre-enlargement European Union since the Exposure of the Khan Network and Recommendations for Preventing Future Catastrophe
	Faculty Mentor	Dr. Gary Bertsch, Department of International Affairs
Room 138	**Rebecca L. Satterfield**	Applying Koch's Postulates of *Mycobacterium shottsii* Infections in Fish
	Faculty Mentor	Dr. Frederick Quinn and Dr. Russell Karls, Department of Infectious Diseases
	John R. Killey	Diagnostic Assay for *Mycoplasma bovis* Using Immunohistochemistry
	Faculty Mentor	Dr. Corrie Brown, Department of Veterinary Pathology
Room 139	**Yannick Morgan**	African Immigrant Integration in Post-industrial Western Societies
	Faculty Mentor	Dr. Abdulahi Osman, Department of International Affairs
	Breonne T. DeDecker	The Rise of Political Islam in East Africa
	Faculty Mentor	Dr. Stephen Shellman, Department of International Affairs
	Yael Miller	Egyptian Life, As Represented in *Adrift on the Nile* and *Zaat*
	Faculty Mentor	Dr. Sherry Lowrance, Department of International Affairs
Room 140	**Mark J. Chilla**	Metrical Dissonance in Robert Schumann's Op. 39
	Faculty Mentor	Dr. John Turci-Escobar, Department of Music Theory & Composition

	Sojourner Hodges	Birdsong in the Minnesang Tradition: Natural Imitation and Symbolic Association
	Faculty Mentor	Dr. David Schiller, Department of Musicology & Ethnomusicology
Room 141	**Joshua J. Watkins**	The Price of Victory: Influences on the Conduct of War
	Faculty Mentor	Dr. Patricia Lynne Sullivan, Department of International Affairs
	Joseph T. Lariscy	Healthcare Coverage among Latinos in an Emerging-gateway Southern State
	Faculty Mentor	Dr. Leigh A. Willis, Department of Sociology
	Lucas L. Puente	American Investment in a Post-Castro Cuba
	Faculty Mentor	Dr. Stephen Shellman, Department of International Affairs
Room 142	**Adele Handy**	Metal-Metal Bonds and Aluminum Clusters
	Faculty Mentor	Dr. Gregory Robinson, Department of Chemistry
	Grant M. Fiddyment	Mathematical Computing: Exploring the Relationship between the Critical Group and Structure of Graphs
	Faculty Mentor	Dr. Dino Lorenzini, Department of Mathematics
	Sergey V. Fogelson	A GP-evolved Formulation for the Relative Permittivity of Water and Steam
	Faculty Mentor	Dr. Walter Potter, Computer Science

10:10 – 11:00 a.m. Second Concurrent Session

Room 137	**Susan S. Guo**	Systematic Empirical Study: The Impact of Sri Lanka's Economy on Dissident Behavior
	Faculty Mentor	Dr. Stephen Shellman, Department of International Affairs
	Andrew W. Pierce	My Neighbor's Keeper: Social Capital as a Means of Mediating Extremist Activity
	Faculty Mentor	Dr. Tom McNulty, Department of Sociology
	Karen C. Wong	Political and Social Foundations for Environmental Sustainability
	Faculty Mentor	Dr. Andrew Whitford, Department of Public Administration & Policy
Room 138	**Blake M. Troiani**	Genetic Systems for the Elimination of Polyphosphate Synthesis in *Mycobacterium avium* Subspecies *paratuberculosis*
	Faculty Mentor	Dr. Russell Karls and Dr. Frederick Quinn, Department of Infectious Diseases

	Jake E. Turrentine	The Role of CD8+ T Cell Responses to Immunodominant Trans-sialidase Epitopes in Control of Experimental *Trypanosoma cruzi* Infection
	Faculty Mentor	Dr. Rick L. Tarleton, Department of Cellular Biology
	Erica M. Hall	Intracellular Gene Transfer from the Mitochondrion to the Nucleus in *Toxoplasma gondii*
	Faculty Mentor	Dr. Jessica C. Kissinger, Department of Genetics
Room 139	**Courtney M. Thomas**	Peyton Wall's Impact on Racial Relations in 1960s Atlanta, Georgia
	Faculty Mentor	Dr. Barbara McCaskill, Department of English
	Karen C. Usselman	Music and Identity among Mexican Immigrants in Atlanta, 1985-2006
	Faculty Mentor	Dr. Pamela Voekel, Department of History
	Emily Powers	Public Space in a New Urbanist Development: A Case Study of Atlantic Station
	Faculty Mentor	Dr. Steven Holloway and Dr. Katherine Hankins, Department of Geography
Room 140	**Helen C. Smith**	Determining Appropriate Social Assistance Models for Children Living in Communities Affected by HIV/AIDS in Sub-Saharan Africa
	Faculty Mentor	Dr. Christopher Allen, Department of International Affairs
	Eva Bonney Reed	Development and Evaluation of a Coping Skills Training Program for Adolescents with Inflammatory Bowel Disease (IBD)
	Faculty Mentor	Dr. Ronald Blount, Department of Psychology
Room 141	**Disha Chhabra**	Indigenous Use of Medicinal Plants and Herbs by the Pavacachi Community of the Ecuadorian Region of the Amazon Rainforest
	Faculty Mentor	Dr. James Affolter, Department of Horticulture
	Jesse N. Oakley	Curbing Private Forestland Divestment: Research into Georgia's Private Forests
	Faculty Mentor	Dr. Laurie Fowler, Institute of Ecology
	Sara B. Johnson	A Biotechnological Approach to Restoration of American Chestnut (*Castanea dentata*): Mass Propagation via Somatic Embryogenesis
	Faculty Mentor	Dr. Scott Merkle, Department of Forestry Research

11:15 a.m. – 12:05 p.m. Third Concurrent Session

Room 137	**Jae W. Jeon, Daniel Alvarez, Jarrad Barber**	Genetic and Environmental Effects on Aggressive Behavior in *Drosophila*
	Faculty Mentor	Dr. Wyatt Anderson, Department of Genetics
	Jodi L. Dyer	The Effects of Antibiotic Use in Food Animals and the Prevalence of Tetracycline Resistance in Bovine Gastrointestinal Commensal Bacteria
	Faculty Mentor	Dr. Susan Sanchez, Athens Diagnostic Laboratory
	Lisa Rivard	Determining the Affinity of Perchlorate for Albumin in Rat Serum Using Equilibrium Dialysis and Ion Chromatography
	Faculty Mentor	Dr. Jeffrey Fisher and Dr. Jerry Campbell, Department of Environmental Health Science
Room 138	**Natalie M. Picchetti**	Effects of Alcohol Use on Cognitive Ability
	Faculty Mentor	Dr. Jennifer McDowell, Department of Psychology
	Aaron K. McPherson	The Influence of Muscle Length on Muscle Oxygen Saturation
	Faculty Mentor	Dr. Kevin McCully, Department of Kinesiology
	Anna M. Moise	Differential Modulation of Anxiety-like Behavior in Syrian Hamsters by Endocannabinoids and Benzodiazepines
	Faculty Mentor	Andrea G. Hohmann, Department of Psychology
Room 139	**Kathryn L. Scheffel**	Femininity as a Continuum: From Battered Victim, to Self-Defense Aggressor, to Lesbian and to Barbarian
	Faculty Mentor	Dr. Dean Rojek, Department of Sociology
	Erika B. Vinson	The Effectiveness of Teaching Expressive Arts Activities Based in the Methods of Art and Drama Therapy to Educators to Improve Student Welfare
	Faculty Mentor	Dr. Richard Siegesmund, Department of Art Education
	Alexander W. Watts	Sexual Orientation as a Diffuse Status Characteristic: The Effects of Sexual Orientation on Expectations in Interaction
	Faculty Mentor	Dr. Dawn Robinson, Department of Sociology
Room 141	**Jennifer S. Ivey**	The Who, What, Where and Why of Georgia's 2006 Agriculture Commissioners Race: An In-depth Look at the Reasons for Tommy Irvin's Landslide Victory over Gary Black
	Faculty Mentor	Dr. Charles Bullock, Department of Political Science

	Katie Orlemanski	Gentrification in Athens, Georgia: A Two-sided Coin in a County with the Fifth Highest Poverty Rate in the Nation
	Faculty Mentor	Dr. Patricia Richards, Department of Sociology
	Deep J. Shah	Unsuspecting Targets – Preparing America's College Towns for a Bioterrorism Attack
	Faculty Mentor	Dr. Loch Johnson, Department of International Affairs
Room 142	**John C. Binford**	A Genetic Exploration of Causal Factors Underlying Differential Recruitment Patters in Chilean Barnacles
	Faculty Mentor	Dr. John Wares, Department of Genetics
	Lindsey Thomas	A Study of Site Formation Processes for the Northwestern Hawaiian Islands
	Faculty Mentor	Dr. Ervan Garrison, Department of Anthropology
	Andrew M. Durso	Environmental and Ontogenetic Changes in Detection Probability of Pond-breeding Salamanders in the Georgia Piedmont
	Faculty Mentor	Dr. John Maerz, Department of Forestry Research

12:20 – 1:10 p.m. Fourth Concurrent Session

Room 137	**Noona Oh**	Gender Meaning Parity and the Gay Movement: A Cross-cultural Study of Developing Movements
	Faculty Mentor	Dr. Dawn Robinson, Department of Sociology
	Michael W. Davis	Sexuality in Israel: Birth of the Gay Rights Movement and Its Struggles for Acceptance in Israeli Society
	Faculty Mentor	Dr. Randy Sturman, Department of Religion
	Maggie Mills	An Empirical Study of Government and Dissident Interactions in Cambodia and Indonesia, 1980-2005
	Faculty Mentor	Dr. Stephen Shellman, Department of International Affairs
Room 138	**Crystal Rapier**	Effects of Mg/HA on Growth and Differentiation of Osteoblast Cells (Bone Cells) in a Hydroxy Apatite Scaffold
	Faculty Mentor	Dr. William Kisaalita, Department of Biological & Agricultural Engineering
	Anant Mandawat, Bradley Allen	Expression and Renaturation of Recombinant HL-1, a Lectin-like Protein that May Function as a Type II Diabetes Therapeutic
	Faculty Mentor	Dr. Michael Pierce, Department of Biochemistry & Molecular Biology

	Ezinne A. Okwandu	Characterizing PGMRC1, an Enzyme Suspected in the Regulation of the Cytochrome P450 CYP51A1
	Faculty Mentor	Dr. William Lanzilotta, Department of Biochemistry & Molecular Biology
Room 139	**Ashley A. Wilkinson**	Investigation of State-controlled Media Outlets and Their Reports on Internal Conflict: A Xinjiang Province Case Study
	Faculty Mentor	Dr. Stephen Shellman, Department of International Affairs
	Danielle L. Pearl	Media Development, Journalism and Democratization in Croatia
	Faculty Mentor	Dr. Keith Langston, Department of Germanic & Slavic Languages
	Katherine B. Church	National Geographic Magazine: What Gets Covered around the World?
	Faculty Mentor	Dr. Leara Rhodes, Department of Journalism
Room 140	**Hsuan Ju Susan Fang**	The Marriage of Expression and Design
	Faculty Mentor	Prof. Christopher Hocking, Departments of Studio Foundations, Drawing & Painting
	Brian L. Harper	Creation of a Computer Game from Concept to Completion
	Faculty Mentor	Dr. Mike Hussey, Department of Theatre & Film Studies
Room 141	**Tulsi Patel**	Developing a Biocontrol Agent for Chinese Privet, *Ligustrum sinense*
	Faculty Mentor	Dr. Scott Gold, Department of Plant Pathology
	Brian T. Laughlin	Functional Analysis of the *Magnaporthe grisea* Secretome
	Faculty Mentor	Dr. Alan Darvill, Departments of Biochemistry & Molecular Biology, Plant Pathology
	Laura A. Thornsberry	The Analysis of Synthetic Neoglycolipids by FTICR Tandem Mass Spectrometry
	Faculty Mentor	Dr. Jon Amster, Department of Chemistry
Room 142	**Jimari L. Jones, Jeremy Atkins**	Early Childhood Education and Family Literacy in Athens
	Faculty Mentor	Dr. Elizabeth DeBray-Pelot, Department of Lifelong Education, Administration & Policy
	Crystal Barber, Kimberly Kite, Toni McCranie, LaToya Jones, Shananikia Marshall	The Influence of Parental Attitudes on Children's Gender Toy Preference
	Faculty Mentor	Dr. Tsu-Ming Chiang, Department of Psychology, Georgia College & State University

	Lionel (Leo) H. White	Mothers' Parenting Styles and Their Toddlers' Compliance
	Faculty Mentor	Dr. Hui-Chin Hsu, Department of Child & Family Development

1:25 – 2:15 p.m. Fifth Concurrent Session

Room 137	**William C. McWhorter, Naseem Esteghamat**	The Path Less Taken: A Progressive Approach to Stem Cell Extraction and Grading
	Faculty Mentor	Dr. J. David Puett, Department of Biochemistry & Molecular Biology
	Elizabeth A. Godbey	Differentiation of Human Embryonic Stem Cells to a Vascular Phenotype
	Faculty Mentor	Dr. Steven Stice, Department of Animal & Dairy Science
	Kiya Birku	O-GlcNAc Modifications in Obese Mouse Models
	Faculty Mentor	Dr. Lance Wells, Department of Biochemistry & Molecular Biology Dr. Ruth Harris, Department of Foods & Nutrition
Room 138	**Nari Shin, Celina Correa, Yuliya Kuzovkova**	The Interaction between Culture, Poverty, and Educational Achievement: How Policy Can Better Impact the Graduation Rates of Georgia's Latino and African American Youth
	Faculty Mentor	Dr. Larry Nackerud, School of Social Work
	Robert B. Lindell	A Field Guide to English/Spanish Medical Translation
	Faculty Mentor	Dr. David S. Williams, Honors Program
Room 139	**Anh V. Trieu, Ashley Bowen**	Trade for Humanity: A Proposal for Viet Nam
	Faculty Mentor	Dr. Maurits Van der Veen, Department of International Affairs
	Aaron M. Sayama	North Korea: Options for Dealing with a Nuclear Armed State
	Faculty Mentor	Dr. Stephen Shellman, Department of International Affairs
	Aqsa Mahmud	Under the Rug Swept: Rural Punjab Women in the Ecotone of Urbanization
	Faculty Mentor	Dr. Fausto Sarmiento, Department of Geography
Room 141	**Zach Fox**	A Cellulosic Ethanol Plan for Athens
	Faculty Mentor	Dr. Thomas Adams, Department of Biological & Agricultural Engineering
	Bryan P. Davis	Awareness of Student Expenditure Patterns
	Faculty Mentor	Dr. Lance Palmer, College of Family & Consumer Sciences

	William Patrick Dever	The Economic Implications of a Marijuana Decriminalization Policy in the United States
	Faculty Mentor	Dr. William Lastrapes, Department of Economics
Room 142	**Sara Douglass, Kelli Webb, Matthew Anderson, Ankita Patel, Jeramy Denton**	The Stability of Children's Gender Toy Preference through a Two-year Longitudinal Study
	Faculty Mentor	Dr. Tsu-Ming Chiang, Department of Psychology, Georgia College & State University
	Traci N. Tucker	An Affect Control Model of Attribution
	Faculty Mentor	Dr. Dawn Robinson, Department of Sociology
	Christopher MacLean	The Effect of Cognitively Challenging Talk on Oral Language Development in Low-income Preschool Children
	Faculty Mentor	Dr. Paula Schwanenflugel, Department of Educational Psychology

2:00 – 3:20 p.m. Creative Writing & Dance

Tate Student Center, Georgia Hall A

Creative Writing & Dance Presenters

Alisan J. Atvur	*Small Emergencies: Poems*
Faculty Mentor	Dr. Ed Pavlic, Department of English
Brittney Inman	*Living in Fire, Ice, and Cardboard*; *Hotter'N Hell*; *Green with a Cowboy Print*; and *Thanksgiving with the Pope, Popeye, and the Mafia*
Faculty Mentor	Prof. Judith Ortiz Cofer, Department of English
Kacie Versaci	*Chicken Water*, *What Are We?*, and *We Are Nothing But the Scraps*
Faculty Mentor	Prof. Judith Ortiz Cofer, Department of English
Hariqbal Basi	*Bollywood Fusion*
Faculty Mentor	Prof. Bala Sarasvati, Department of Dance Dr. Pamela Kleiber, Honors Program
Cara O'Grady	*Brief – Solo Study Utilizing Crafting Devices in Dance* Choreography
Faculty Mentor	Prof. Bala Sarasvati, Department of Dance
Mia Holtzman	*The Integration of Aesthetic Principles and Human Movement*
Faculty Mentor	Prof. Bala Sarasvati, Department of Dance

Mary Mattmann	*Gone but not – Making Dance through Improvisation*
Faculty Mentor	Prof. Rebecca Enghauser, Department of Dance

2:30 – 3:45 p.m. Sixth Concurrent Session

Room 137	**Mia Catherine Morgan**	Zeolites of Eastern Uganda and Their Scientific, Social, and Economic Potential
	Faculty Mentor	Dr. William Kisaalita, Department of Biological & Agricultural Engineering
	Samantha E. Keyes-Blumer	The Role of Extremism in the Arab-Israeli Conflict
	Faculty Mentor	Dr. Christopher Allen, Department of International Affairs
	Yael Miller	US Involvement in the Reconstruction of Lebanon
	Faculty Mentor	Dr. Sherry Lowrance, Department of International Affairs
	Andrew I. Gladden, Patrick Bentley	Escalation or Acquiescence? An Analysis of Sequential Dissident Responses to Repression in Indonesia
	Faculty Mentor	Dr. Stephen Shellman, Department of International Affairs
Room 138	**Katharine A. Owers**	The Effects of Heat Shock on the Lethality of Subsequent Infection in *Drosophila melanogaster*
	Faculty Mentor	Dr. Daniel Promislow, Department of Genetics
	Nithya M. Natrajan	Effects of Glycerol on Processing of Kit Ligand Mutants in Mammalian Cells
	Faculty Mentor	Dr. Mary Bedell, Department of Genetics
	Jessica M. Bryant	Katanin Plays a Role in Microtubule Dynamics and Ciliary Assembly in *Tetrahymena thermophila*
	Faculty Mentor	Dr. Jacek Gaertig, Department of Cellular Biology
	Leilah D. Zahedi	The Effects of Colostral Leukocytes on TNFα Levels in Neonatal Calves
	Faculty Mentor	Dr. David Hurley, Department of Large Animal Medicine
Room 139	**Rebecca Anne Creasy**	Formulation of a Stable Acidified Dairy Beverage Containing Ellagic Acid
	Faculty Mentor	Dr. Louise Wicker, Department of Food Science & Technology
	Amy J. Burrell	Construction of and Use of GAUT1 and GAUT7 Reporter Gene Constructs to Study GAUT1 and GAUT7 Transcriptional Activity in Plants
	Faculty Mentor	Dr. Debra Mohnen, Department of Biochemistry & Molecular Biology

	Lamar H. Moree	Gene Knockout Analysis of Two Putative Xylanase-regulating Transcription Factors in the Rice Blast Fungus
	Faculty Mentor	Dr. Alan Darvill, Departments of Biochemistry & Molecular Biology, Plant Pathology Dr. Sheng-Cheng Wu, Complex Carbohydrate Research Center
	Mandy Redden	Towards a More Effective Delivery System for Anti-cancer Drugs
	Faculty Mentor	Dr. Robert Arnold, Department of Pharmaceutical & Biomedical Sciences
Room 140	**Sana Hashmi**	Site-mapping and Glycan Characterization of Functional Alpha-Dystroglycan
	Faculty Mentor	Dr. Lance Wells, Department of Biochemistry & Molecular Biology
	Yayne Fekadu	The Interaction of Natural Killer Receptor + T-cells with *Campylobacter jejuni*
	Faculty Mentor	Dr. Joan O'Keeffe, Department of Biochemistry, National University of Ireland, Galway
	Ezinne A. Okwandu	Tax Binding to Various CBP Domains
	Faculty Mentor	Dr. Jennifer Nyborg, Department of Biochemistry & Molecular Biology, Colorado State University
	Richard C. Piercy	Expression, Optimization and Crystallization of Cystathionine β-Synthase and Cystathionine γ-Lyase
	Faculty Mentor	Dr. Cory Momany, Department of Biomedical & Pharmaceutical Sciences
Room 141	**Seychelle M. Vos**	Initial Sequencing and Tissue Distribution of Toll-like 3 Receptor mRNA in White-tailed Deer
	Faculty Mentor	Dr. Elizabeth Howerth, Department of Veterinary Pathology
	Aaron C. Petrey	Polygalacturonase-inhibiting Proteins and Their Relationship to Polygalacturonases
	Faculty Mentor	Dr. Carl Bergmann, Complex Carbohydrate Research Center
	Liron Bar-Peled	Analysis of Why RNase P Is Essential for Cell Viability in *Escherichia coli*
	Faculty Mentor	Dr. Sidney Kushner, Department of Genetics
	Zion Firew	Characterization of Putative Genes that Encode the Enzymes Arabinose Kinase and Galactose Oxidase: Enzymes Involved in the Biosynthesis of Sugar Nucleotides
	Faculty Mentor	Dr. Maor Bar-Peled, Department of Plant Biology

Room 142	**Sonia Talathi**	Calcium-independent Phospholipase A_2 Are Novel Targets for Inhibition of Prostate Cancer Cell Growth
	Faculty Mentor	Dr. Brian S. Cummings, Department of Pharmaceutical & Biomedical Sciences
	Paul A. Henkel	RGS Proteins Regulate LPA Signaling in Ovarian Cancer Cells
	Faculty Mentor	Dr. Shelley Hooks, Department of Pharmaceutical & Biomedical Sciences
	Rachelle W. Wallace	Identification of L-PHA Reactive Glycoproteins from Invasive Breast Carcinoma Tissue: Potential Biomarkers for Early Detection
	Faculty Mentor	Dr. Michael Pierce, Department of Biochemistry & Molecular Biology
	Madeline C. Elliott	Calmodulin Activation of Estrogen Receptor α: Cloning and Expression of a Fusion Protein for Defining the Calmodulin Binding Determinants
	Faculty Mentor	Dr. Jeffrey L. Urbauer, Department of Biochemistry & Molecular Biology
Room 143	**Andrew C. McKown**	Determining Cost of Medical Sharps Disposal at a Local Health Center in Uganda
	Faculty Mentor	Dr. Robert T. Chen, Centers for Disease Control & Prevention
	Christina L. Faust	Influence of Bivalves on the Persistence of Avian Influenza Virus in Water
	Faculty Mentor	Dr. David Stallknecht, Department of Infectious Diseases
	Melinda B. Murray	Evaluation of Direct Plating Methods to Enumerate *Alicyclobacillus* in Beverages
	Faculty Mentor	Dr. Larry R. Beuchat, Department of Food Science & Technology
Room 145	**Brian Levy**	The English-only Movement: A Critical Analysis through Comparative Study of French Language Regulation
	Faculty Mentor	Dr. Larry Nackerud, School of Social Work
	Elizabeth K. Hebbard	A Universal Language? Translation and Cultural Imperialism in the Writings of Karl Vossler and Alphonse Daudet
	Faculty Mentor	Dr. Martin Kagel, Department of Germanic & Slavic Languages

Melissa E. Whatley	The Effect of Age on Subject Doubling in French
Faculty Mentor	Dr. Diana Ranson, Department of Romance Languages
Katie Griffith	Subject Expression in Nicaraguan Spanish: An Analysis of Linguistic and Pragmatic Factors
Faculty Mentor	Dr. Diana Ranson, Department of Romance Languages

4:00 p.m. Welcome and Opening Session

Tate Student Center, Georgia Hall A

Introductions and Welcome	Dr. David S. Williams, Director, Honors Program Dr. David C. Lee, Vice President for Research Dr. Arnett C. Mace, Jr., Provost
Introduction of Prof. Fink	Douglas Jackson, CURO Summer Research Fellow and CURO Scholar
Keynote Address ***The Researcher and the Wide, Wild World of the Internet***	Prof. Conrad Fink Josiah Meigs Distinguished Teaching Professor Morris Chair of Newspaper Strategy & Management
CURO Promising Scholars	Dr. David S. Williams, Director, Honors Program
Excellence in Undergraduate Research Mentoring Awards	Dr. Arnett C. Mace, Jr., Provost Dr. Pamela Kleiber, Associate Director, Honors Program

5:00 p.m. Poster Presentations

Tate Student Center, Georgia Hall A & B

Laura M. Aikens	Self-concept Perception following Subliminal Exposure to Brand Personalities
Faculty Mentor	Dr. W. Keith Campbell, Department of Psychology
Shivan P. Bhatt	Membrane Topology Studies of Rce1p
Faculty Mentor	Dr. Walter K. Schmidt, Department of Biochemistry & Molecular Biology
Kiya Birku	O-GlcNAc Modifications in Obese Mouse Models
Faculty Mentor	Dr. Lance Wells, Department of Biochemistry & Molecular Biology Dr. Ruth Harris, Department of Foods & Nutrition
Sarah R. Breevoort	Towards the Discovery of Ras-converting Enzyme Inhibitors: A Novel Oncogenic (Anti-cancer?) Target
Faculty Mentor	Dr. Walter K. Schmidt, Department of Biochemistry & Molecular Biology

Ashley C. Burch	Developing Synchronization Protocols in Ewes
Faculty Mentor	Dr. William Graves, Department of Animal & Dairy Science
Charles P. Callihan	Sexual Selection and the Relevance of Female Choice in *Drosophila*
Faculty Mentor	Dr. Wyatt Anderson, Department of Genetics Dr. Yong-Kyu Kim, Department of Genetics
Colony C. Canady	The Role of Hispanic Media in Athens-Clarke County
Faculty Mentor	Dr. Leara Rhodes, Department of Journalism
Kevin K. Chang	Immobilization of Xyloglucan-specific Endo-β-1,4-Glucanase: Activity and Nectarin IV Inhibition
Faculty Mentor	Dr. William York, Department: Biochemistry & Molecular Biology
Chuan Cheng	Analyzing the Interactions of Acidic Matrix Polysaccharides with Cell Surface and Matrix Proteins Using Surface Plasmon Resonance
Faculty Mentor	Dr. Carl Bergmann, Complex Carbohydrate Research Center
Jean Chi	Strength in Numbers: Parasite Transmission and Virulence in Monarch Butterflies
Faculty Mentor	Dr. Sonia Altizer, Institute of Ecology
Lauren Coffey	The Repression of Dissent: Multi-Group Dissident Responses to State Repression in Burma, 1980-2005
Faculty Mentor	Dr. Stephen Shellman, Department of International Affairs
Caelin A. Cubeñas	Studies of Hirano Bodies and Oxidative Stress in Neuroglioma Cells
Faculty Mentor	Dr. Marcus Fechheimer and Dr. Ruth Furukawa, Department of Cellular Biology
Kimberly B. Cunningham	Association between Infant Feeding and Body Composition
Faculty Mentor	Dr. Alex Anderson, Department of Food & Nutrition
Dilhara T. De Silva	Mechanisms of Bromide- and Bromate-induced Kidney and Liver Cell Death
Faculty Mentor	Dr. Brian S. Cummings, Department of Pharmaceutical & Biomedical Sciences
Vanessa M. del Valle	Analysis of the Self-serving Bias Using EEG
Faculty Mentor	Dr. W. Keith Campbell, Department of Psychology
Andrew M. Durso	Environmental and Ontogenetic Changes in Detection Probability of Pond-breeding Salamanders in the Georgia Piedmont
Faculty Mentor	Dr. John Maerz, Department of Forestry Research

Madeline C. Elliott	Calmodulin Activation of Estrogen Receptor α: Cloning and Expression of a Fusion Protein for Defining the Calmodulin Binding Determinants
Faculty Mentor	Dr. Jeffrey L. Urbauer, Department of Biochemistry & Molecular Biology
Christina L. Faust	Influence of Bivalves on the Persistence of Avian Influenza Virus in Water
Faculty Mentor	Dr. David Stallknecht, Department of Infectious Diseases
Yayne Fekadu	The Interaction of Natural Killer Receptor + T-cells with *Campylobacter jejuni*
Faculty Mentor	Dr. Joan O'Keeffe, Department of Biochemistry, National University of Ireland, Galway
Grant M. Fiddyment	Mathematical Computing: Exploring the Relationship between the Critical Group and Structure of Graphs
Faculty Mentor	Dr. Dino Lorenzini, Department of Mathematics
Mary B. Gassama	Investigation of the Genetic Population Structure of the Canine Hookworm, *Ancylostoma caninum*
Faculty Mentor	Dr. Ray Kaplan, Department of Infectious Diseases
Gabrielle D. Gay	Effects of 8-2 Fluorotelomer Alcohol on Gene Expression and Pregnancy Outcome in Mice
Faculty Mentor	Dr. Mary Alice Smith, Department of Environmental Health Science
Courtney Grant	An Investigation of Botulinum Neurotoxin Interactions on RhoA Activity Using *In Vitro* Assays
Faculty Mentor	Dr. Julie Coffield, Department of Physiology & Pharmacology
Sana Hashmi	Site-mapping and Glycan Characterization of Functional Alpha-Dystroglycan
Faculty Mentor	Dr. Lance Wells, Department of Biochemistry & Molecular Biology
Paul A. Henkel	RGS Proteins Regulate LPA Signaling in Ovarian Cancer Cells
Faculty Mentor	Dr. Shelley Hooks, Department of Pharmaceutical & Biomedical Sciences
Annie Huang	Epistatic Interactions among Long-lived *Drosophila melanogaster* Mutants
Faculty Mentor	Dr. Daniel Promislow, Department of Genetics
Margaret A. Hubbard	Magnitude of the Inverse Relationship between Nighttime Transpiration and Hydraulic Redistribution in *Quercus laevis*
Faculty Mentor	Dr. Lisa A. Donovan, Department of Plant Biology

Justin L. Hula	Taking *Clostridium thermocellum* ORFans from the ORFanage and Crystallizing Them in Search of Possible Novel Folds
Faculty Mentor	Dr. Claiborne Glover, Department of Biochemistry & Molecular Biology
Jae W. Jeon, Daniel Alvarez, Jarrad Barber	Genetic and Environmental Effects on Aggressive Behavior in *Drosophila*
Faculty Mentor	Dr. Wyatt Anderson, Department of Genetics Dr. Yong-Kyu Kim, Department of Genetics
Heather E. Johnson	Screening of Fosmid Library of Environmental Genomic DNA from Sapelo Island
Faculty Mentor	Dr. James Hollibaugh, Department of Marine Sciences
Joseph P. Johnson	DNA Recognition by a Novel Recombinase
Faculty Mentor	Dr. Anna Karls, Department of Microbiology
Sara B. Johnson	A Biotechnological Approach to Restoration of American Chestnut (*Castanea dentata*): Mass Propagation via Somatic Embryogenesis
Faculty Mentor	Dr. Scott Merkle, Department of Forestry Research
Kunal N. Kanani	Sampling Ambient Air to Test for Polycyclic Aromatic Hydrocarbons
Faculty Mentor	Dr. Geoff Smith, Department of Chemistry
John R. Killey	Diagnostic Assay for *Mycoplasma bovis* Using Immunohistochemistry
Faculty Mentor	Dr. Corrie Brown, Department of Veterinary Pathology
Aaron K. McPherson	The Influence of Muscle Length on Muscle Oxygen Saturation
Faculty Mentor	Dr. Kevin McCully, Department of Kinesiology
Natalie D. Kolleda	Tracking Continent-wide Parasite Spread in Monarch Butterflies: Launching a New Citizen Science Project, MonarchHealth
Faculty Mentor	Dr. Sonia Altizer, Institute of Ecology
Christopher H. Kragor	Synthesis and Photochemistry of 8-Cyano-7-hydroxyquinoline (CHQ): A Photolabile Protecting Group with a High Photochemical Quantum Efficiency for Biological Use
Faculty Mentor	Dr. Timothy Dore, Department of Chemistry
Aqsa Mahmud	Under the Rug Swept: Rural Punjab Women in the Ecotone of Urbanization
Faculty Mentor	Dr. Fausto Sarmiento, Department of Geography
Dakia McCray	Models of Diversity
Faculty Mentor	Dr. Victoria Plaut, Department of Psychology

John Nagao	Annotation of Cuticular Protein Genes in *Anopheles gambiae*
Faculty Mentor	Dr. Judith Willis, Department of Cellular Biology
Nithya M. Natrajan	HESX1 Mutations in Idiopathic Hypogonadotropic Hypogonadism
Faculty Mentor	Dr. Lawrence Layman, Department of Obstetrics & Gynecology, Medical College of Georgia
Victor M. Orellana	Kinetics of Inhibition of Polygalacturonases and Polygalacturonase-inhibiting Proteins
Faculty Mentor	Dr. Carl Bergmann, Complex Carbohydrate Research Center
Shreyal C. Patel	Infectious Plant Pathogen: *Botrytis cinerea*
Faculty Mentor	Dr. Carl Bergmann, Complex Carbohydrate Research Center
Tulsi Patel	Developing a Biocontrol Agent for Chinese Privet, *Ligustrum sinense*
Faculty Mentor	Dr. Scott Gold, Department of Plant Pathology
Daniel Perry	Metropolis Monte Carlo Simulations of Thin Ferromagnetic/Antiferromagnetic Bilayers
Faculty Mentor	Dr. David Landau, Department of Physics & Astronomy
Aaron C. Petrey	Polygalacturonase-inhibiting Proteins and Their Relationship to Polygalacturonases
Faculty Mentor	Dr. Carl Bergmann, Complex Carbohydrate Research Center
Natalie M. Picchetti	Effects of Alcohol Use on Cognitive Ability
Faculty Mentor	Dr. Jennifer McDowell, Department of Psychology
Crystal Rapier	Effects of Mg/HA on Growth and Differentiation of Osteoblast Cells (Bone Cells) in a Hydroxy Apatite Scaffold
Faculty Mentor	Dr. William Kisaalita, Department of Biological & Agricultural Engineering
Rachel M. Rarick	Migration Reduces Parasite Prevalence in Monarch Butterflies
Faculty Mentor	Dr. Sonia Altizer, Institute of Ecology
Clare H. Scott	Identifying the Source of an Introduction of Yellowfin Shiner
Faculty Mentor	Dr. John Wares, Department of Genetics
Neel N. Shah	Construction of Plasmids for Deletion of the Polyphosphate Kinase Gene in *Mycobacterium tuberculosis*
Faculty Mentor	Dr. Russell Karls, Department of Infectious Diseases
Christopher S. Sharp	Development of Leptin Resistance through High-fructose Diet
Faculty Mentor	Dr. Ruth Harris, Department of Food & Nutrition

Karin K. Sheehan	Short-term Storage of MDBK Cells
Faculty Mentor	Dr. Jeremiah Saliki, Athens Diagnostic Laboratory
Myra J. Stone	The CO-H2 Variation in Translucent Clouds at Small Scales
Faculty Mentor	Dr. Loris Magnani, Department of Physics & Astronomy
Ryan J. Summers	Characterization of the *vgat* Expression Pattern in the Developing Mouse Brain
Faculty Mentor	Dr. Brian Condie, Department of Genetics
Sonia Talathi	Calcium-independent Phospholipase A_2 Are Novel Targets for Inhibition of Prostate Cancer Cell Growth
Faculty Mentor	Dr. Brian S. Cummings, Department of Pharmaceutical & Biomedical Sciences
Christine E. Tarleton	Gene Expression Profiles of Neuronal Cells Derived from Human Embryonic Stem Cells
Faculty Mentor	Dr. Steven Stice, Department of Animal & Dairy Science
Prince Tieku	Glycosyl Composition Analysis of *Rhizobium leguminosarum* 3841 Bacteroids
Faculty Mentor	Dr. Russell Carlson, Department of Biochemistry & Molecular Biology
Jake E. Turrentine	Parasite Strain-dependent Cariation in CD8+ T Cell Responses Is a General Characteristic of Experimental *Trypanosoma cruzi* Infection
Faculty Mentor	Dr. Rick L. Tarleton, Department of Cellular Biology
Anna Tyler	The Effect of Women as Candidates in Congressional Campaigns
Faculty Mentor	Dr. Ruthann Lariscy, Department of Advertising & Public Relations
Seychelle M. Vos	Initial Sequencing and Tissue Distribution of Toll-like 3 Receptor mRNA in White-tailed Deer
Faculty Mentor	Dr. Elizabeth Howerth, Department of Veterinary Pathology
Rachelle W. Wallace	Identification of L-PHA Reactive Glycoproteins from Invasive Breast Carcinoma Tissue: Potential Biomarkers for Early Detection
Faculty Mentor	Dr. Michael Pierce, Department of Biochemistry & Molecular Biology
Brooke L. Wheeler	Investigation of the Horizontal Transfer of Virulence Factors of *Staphylococcus aureus* between Humans and Companion Animals
Faculty Mentor	Dr. Susan Sanchez, Athens Diagnostic Laboratory
Jasmaine D. Williams	The Broken Bridge: Discovering Why Alpha-Dystroglycan Loses Its Function
Faculty Mentor	Dr. Lance Wells, Department of Biochemistry & Molecular Biology

Kathryn E. Williamson	Titanium Carbide Nanocrystals: A Storage Medium for the Coming Hydrogen Economy?
Faculty Mentor	Dr. Steven P. Lewis, Department of Physics & Astronomy
Shannon F. Yu	Molecular Regulation of Parathyroid Organogenesis in the Mouse
Faculty Mentor	Dr. Nancy R. Manley, Department of Genetics
Jessica Zaleon	Lectin Histochemistry of Cell-surface Glycoproteins of the Non-pathogenic Ciliate *Tetrahymena thermophila* and the Pathogenic Ciliate *Ichthyophthirius multifiliis*
Faculty Mentor	Dr. Thomas Krunkosky, Department of Veterinary Anatomy & Radiology

6:15 p.m. Art Gallery Talks

Student Learning Center, Fourth Floor Rotunda

Introductions	Prof. Georgia Strange, Director, Lamar Dodd School of Art Ms. Nora Wendl, Gallery Director, Lamar Dodd School of Art

Visual Arts Presenters

Roman Alvarado Benitez	*Calendar: Year of the Boar 2007*
Faculty Mentor	Prof. Susan Roberts, Department of Graphic Design
Nikki Couppee	*Flavor of Jude*
Faculty Mentor	Prof. Rob Jackson and Prof. Mary Hallam Pearse, Department of Jewelry & Metalwork
Rachel Egger	*Plasse*
Faculty Mentor	Prof. Susan Roberts, Department of Graphic Design
Hsuan Ju Susan Fang	*The Marriage of Expression and Design*
Faculty Mentor	Prof. Christopher Hocking, Departments of Studio Foundations and Drawing & Painting
Comusina Celan Hardman	*The Face of Costa Rica*
Faculty Mentor	Prof. Joseph Norman, Department of Drawing & Painting
Carol M. Herbert	*NERUDA*
Faculty Mentor	Prof. Susan Roberts, Department of Graphic Design
Cassie L. Hester	*Hand to Mind Coordination*
Faculty Mentor	Prof. Susan Roberts and Prof. Alex Murawski, Department of Graphic Design

Matt Howell Faculty Mentor	*It's lonely out here* Prof. Alex Murawski and Prof. Susan Roberts, Department of Graphic Design
Kerry Jones Faculty Mentor	*Intersections* Prof. Andrea Trombetta, Department of Fabric Design
Chandler Leathers Faculty Mentor	*Soldier Series Fall 2006* Prof. Michael Marshall and Prof. Stephen Scheer, Department of Photography
Patricia Lynn Rhudy Faculty Mentor	*Conversations with God* Prof. Ted Saupe and Prof. Sun Koo Yuh, Department of Ceramics
Lindsey Thomas Faculty Mentor	*The Caddo Bateau* Prof. R. G. Brown, Departments of Sculpture and Studio Foundations
Laura Wood Faculty Mentor	*Poppy Reliquaries* and *Tissue Ring* Prof. Rob Jackson and Prof. Mary Hallam Pearse, Department of Jewelry & Metalwork

Art exhibit arranged by Ms. Nora Wendl, Gallery Director, Lamar Dodd School of Art

8:00 p.m. Dessert Reception & Awards Ceremony

Student Learning Center, Fourth Floor Rotunda

Presentation of CURO Summer Research Fellows, CURO Scholars, UGA Libraries Undergraduate Research Awards, and Best Paper Awards	Dr. David S. Williams, Director, Honors Program Ms. Florence E. King, Assistant University Librarian for Human Resources and Director, Student Learning Center Ms. Deborah Dietzler, Executive Director, UGA Alumni Association

The office of the Senior Vice President for Academic Affairs and Provost and the Honors Program established the Excellence in Undergraduate Research Mentoring Award in 2001. This award recognizes faculty, departments, and programs devoted to outstanding research mentorship of undergraduate students. In 2006, the Graduate School and the Honors Program established a new award that recognizes graduate students devoted to the research mentorship of undergraduate students. Awards will be presented at the CURO Symposium Awards Ceremony on Monday, April 9, 2007 at 4:00 p.m. in the Tate Student Center, Georgia Hall A.

2007 Awards

Master Level Faculty Award
Dr. Timothy Hoover, Associate Professor of Microbiology
Early Career Faculty Award
Dr. Steven Stice, Professor of Animal & Dairy Science

2006 Awards

Master Level Faculty Award
Dr. Patricia Hunt-Hurst, Associate Professor of Textiles, Merchandising & Interiors
Early Career Faculty Award
Dr. Rodney Mauricio, Professor of Genetics
Graduate Student Award
Christopher Anderson, PhD candidate in Ecology
Graduate Student Recognition
Dawn Holligan, PhD student in Plant Biology

2005 Awards

Faculty Awards
Dr. Gary Barrett, Odum Professor of Ecology
Dr. Sidney Kushner, Professor of Genetics
Department Award
Department of Cellular Biology

2004 Award

Faculty Award
Dr. William S. Kisaalita, Associate Professor of Biological & Agricultural Engineering

2003 Awards

Faculty Award
Dr. Jody Clay-Warner, Assistant Professor of Sociology
Department Award
Department of Microbiology
Dr. Duncan Krause, Department Head
Dr. Timothy Hoover, Undergraduate Coordinator
Program Award
The Pratt Laboratory of Plant Genomics and Bioinformatics
Dr. Lee H. Pratt, Professor
Dr. Marie-Michèle Cordonnier-Pratt, Senior Research Scientist

2002 Awards

Faculty Awards
Professor William D. Paul, Jr., Professor of Art
Dr. Katherine Kipp, Associate Professor of Psychology
Faculty Recognition
Dr. Susan Sanchez, Assistant Professor of Veterinary Medicine
Department Award
Department of Biochemistry & Molecular Biology
Dr. J. David Puett, Department Head
Program Award
"Physics Beyond the Boundaries": National Science Foundation, REU Program
Dr. Loris Magnani, Principal Investigator, Professor of Physics and Astronomy
Dr. Heinz-Bernd Schuttler, Professor and Department Head of Physics and Astronomy
Dr. Jonathan Arnold, Professor of Genetics
Dr. Susmita Datta, Professor, Georgia State University
Dr. David Logan, Professor, Clark Atlanta University
Dr. William Steffans, Professor, Clark Atlanta University

2001 Awards

Faculty Award
Dr. Marcus Fechheimer, Professor of Cellular Biology
Faculty Recognition
Dr. David MacIntosh, Associate Professor of Environmental Health Sciences
Dr. Dean Rojek, Associate Professor of Sociology
Department Award
Genetics Department
Dr. John MacDonald, Department Head and Professor
Program Award
Savannah River Ecology Laboratory
Dr. Paul Bertsch, Director

Thanks and Acknowledgements

Graduate Student Reviewers for CURO 2007 Symposium

Chris Bennett	Computer Science
Sarah Craven	Microbiology
John M. Davis	Ecology
Geneva DeMars	Biochemistry & Molecular Biology
Matt First	Marine Sciences
Ivy Holliman	History
Mary Johnson	Forestry & Natural Resources Management
Lisa Kanizay	Plant Biology
Maria Ruth Martinez Rodriguez	Anthropology
Anna McKee	Forestry & Natural Resources Management
Rebecca Nordin	Educational Psychology
Greta Polites	Management Information Systems
Semmy Purewal	Computer Science
Sarah Reiff	Cellular Biology
Jane Shevtsov	Ecology
Chip Small	Ecology
Sara Steger	English
James Tucker Swindell II	Biochemistry

Reviewers for Best Paper Awards

Caroline Barratt	Reference Librarian, UGA Libraries
Dr. Brian Cummings	Assistant Professor, Pharmaceutical & Biomedical Sciences
Dr. Christy Desmet	Associate Professor, English
Dr. Jay Hakes	Director, Jimmy Carter Library & Museum
Diana Hartle	Reference Librarian, UGA Libraries
Dr. Margaret Holt	Professor Emerita, Adult Education
Dr. Sylvia Hutchinson	Professor Emerita, Language & Literacy Education and Institute of Higher Education
Greta Polites	Graduate Student, Management Information Systems
Deb Raftus	Reference Librarian, UGA Libraries
Dr. Dawn Robinson	Associate Professor, Sociology
Jill Severn	Reference Librarian, UGA Libraries
Dr. Fran Teague	Meigs Professor, English
Elizabeth White	Reference Librarian, UGA Libraries

Reviewers for Excellence in Undergraduate Research Mentoring Awards

Dr. Sheila W. Allen	Dean and Professor, College of Veterinary Medicine
Dr. Marcus Fechheimer	Professor, Cellular Biology, Franklin College of Arts & Sciences
Dr. Kecia M. Thomas	Interim Director, Institute for African America Studies; Professor, Psychology, Franklin College of Arts & Sciences

Reviewers for CURO Summer Research Fellowships

Dr. E. M. (Woody) Beck	Professor, Sociology
Dr. Diane Bates Morrow	Associate Professor, History and African-American Studies
Dr. Fran Teague	Meigs Professor, English
Dr. Daniel Promislow	Professor, Genetics
Dr. Jean Martin-Williams	Professor, Brass
Dr. Rodney Mauricio	Associate Professor, Genetics
Dr. Loris Magnani	Professor, Physics & Astronomy
Dr. Regina A. Smith	Associate Vice President for Research

CURO Advisory Board

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Dr. Fausto Sarmiento	Assistant Professor, Geography
Dr. Steven Stice	Senior Research Scientist and Associate Professor, Animal & Dairy Science
Dr. Katharina Wilson	Professor, Comparative Literature
Hariqbal Basi	Undergraduate Student
Caelin Cubeñas	Undergraduate Student
Douglas Jackson	Undergraduate Student

Ex Officio

Dr. David S. Williams	Director of the Honors Program, Foundation Fellows, and CURO
Dr. Pamela B. Kleiber	Associate Director of the Honors Program and CURO

CURO Gateway Seminar Faculty

Prof. Mark Callahan	Ideas for Creative Expression (ICE)
Dr. Ron Carroll	Ecology
Dr. Kathleen DeMarrais	Social Science Education
Dr. Joseph Dominick, Jr.	Journalism
Dr. William Eiland	Art History
Dr. Marcus Fechheimer	Cellular Biology
Dr. Maryann P. Feldman	Institute of Higher Education
Dr. Joe Fu	Mathematics
Dr. Katarzyna Jerzak	Comparative Literature
Dr. Pamela B. Kleiber	Honors Program and CURO
Dr. Elizabeth Kraft	English
Dr. Marc L. Lipson	International Business
Dr. Tricia Lootens	English
Dr. Larry Nackerud	Social Work
Dr. Jeffry Netter	Banking and Finance
Dr. Rosemary Phelps	Counseling Psychology and Human Services
Dr. David Porter	Botany
Dr. Dean Rojek	Sociology
Dr. Paul A. Schroeder	Geology
Dr. Scott Shamp	Telecommunications
Dr. Stephen Shellman	International Affairs
Dr. Sheila Slaughter	Institute of Higher Education
Dr. Michael Terns	Biochemistry and Molecular Biology
Dr. Kecia Thomas	Psychology
Dr. Scott L. Thomas	Institute of Higher Education
Dr. Katharina Wilson	Comparative Literature

Karen A. Holbrook Academic Support Award Recipients

2006 Award

Jody L. Dyer
Faculty Mentor — Dr. Susan Sanchez, Athens Diagnostic Lab, College of Veterinary Medicine

2005 Award

Josef Broder
Faculty Mentor — Dr. Andrew Sornborger, Department of Mathematics

2004 Award

Steven Jocoy
Faculty Mentor — Dr. Michael Bender, Department of Genetics

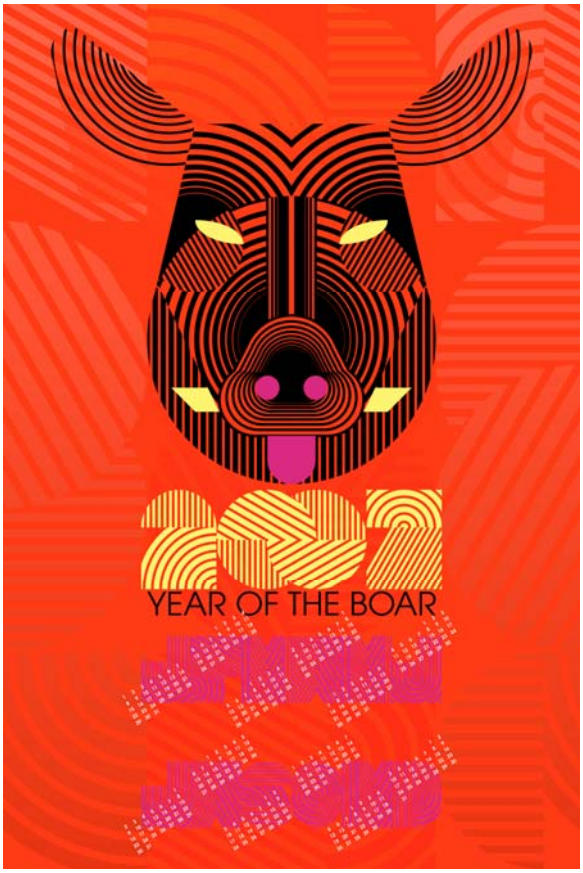
Self-concept Perception Following Subliminal Exposure to Brand Personalities

Laura M. Aikens – CURO SCHOLAR
Dr. W. Keith Campbell, Department of Psychology, University of Georgia

Marketing research has concluded that brand name products can be rated on five personality dimensions: sincerity, ruggedness, competence, excitement, and sophistication. An extension of this work has shown that following an interaction with products possessing certain brand personalities, individuals rated themselves higher on related dimensions. Furthermore, psychological research has shown that the self-concept can be influenced by unconscious sources. The goal of the present research was to examine the effect of implicit exposure to brand personalities on self-concept. We hypothesized that subliminal exposure to brands from one dimension will increase the cognitive accessibility of related personality characteristics. This research may aid in understanding the influence of commercialized media on personality. In Study 1, participants were primed with the names of either sincere brands (e.g. Hallmark) or rugged brands (e.g. NorthFace). To assess if this priming affected self-concept, participants were presented with adjectives and asked to decide if the word described them or not. In Study 2, participants were tested on various dispositional attributes including self-monitoring and materialism. The rest of the procedure was the same as Study 1 except brand logo primes replaced brand word primes. Results of Study 1 indicated that participants primed with sincere brand names more often described themselves as "sincere." Results for Study 2 indicated that dispositional materialism affected self-description after priming. Overall, these results suggested that self-concept can be influenced by brand names, but further research in necessary to fully understand the relationship.

Calendar: Year of the Boar 2007

Roman Alvarado Benitez
Prof. Susan Roberts, Department of Graphic Design, University of Georgia



Graphic Design differs from Fine Art primarily in the immediacy of its communication. Although subtlety is a great asset and is often employed in my own designs, my goal is usually to communicate efficiently. This calendar was designed for self-promotional purposes and employs the simple idea that 2007 is a year of the boar in Chinese astrology. The more important aspects of this poster are the influences of modernist and pre-Hispanic American design. My goal was to create a composition that showcased the essential geometry of an image and entertained the viewer without excessive decoration. The primary image was first abstracted free-hand from a photograph. The resulting image was scanned and imported into Adobe Illustrator where it was further simplified. The striations were added last and

are meant to follow the planes of the original image.

Epson Ultrachrome Ink on coated paper
12 in. x 18 in.
2006

Small Emergencies: Poems
Alisan J. Atvur – CURO SCHOLAR
Dr. Ed Pavlic, Department of English, University of Georgia

The original poems found in my creative thesis entitled *"The Bored Orderly: Poems"* are the result of two years of research in the field of modern American and Polish poetry. My research advisors are Dr. T.R. Hummer, nationally renowned poet and essayist, and Dr. Katarzyna Jerzak, associate professor of comparative literature at the University of Georgia. My thesis is a result of my fascination with the limpid, intelligent verse of Polish poets Wisława Szymborska and Zbigniew Herbet as well as American poets Carl Dennis and Tony Hoagland. The concern of my poetry is foremost the lucidity of well-crafted verse. Though my poems do not share a common theme or subject, many of the poems tackle the psychosis of the modern flâneur. The elegiac voice of many of the poems is a result of having lost several women in my life in the past six years. Works that most directly influenced the poems found in my thesis include Carl Dennis' *Practical Gods*, Wisława Szymborska's *Collected Poems*, Donald Hall's *Without*, Tony Hoagland's *What Narcissism Means to Me*, David Kirby's *Saving the Young Men of Vienna*, Rodney Jones' *Salvation Blues*, T.R. Hummer's *The Angelic Orders* and William Matthew's *Search Party*. As my interdisciplinary degree involves poetry, writing and education, the presentation of my thesis will consist of the reading of several of my poems punctuated with a discussion on my editing positions with the *Georgia Review* and the *Chattahoochee Review* and my research in introducing poetry to younger audiences.

The Influence of Parental Attitudes on Children's Gender Toy Preference
Crystal Barber, Kimberly Kite, Toni McCranie, LaToya Jones & Shananikia Marshall
Dr. Tsu-Ming Chiang, Department of Psychology, Georgia College & State University

Parental influence on toy preferences is evident for children as young as two years of age. The communication between the parents and their children during play is crucial to the development of the children's gender identities. Existing literature addresses how parents interact with their children according to each child's gender. However, parental gender attitudes and their influence on the development of children's preferences for gender-specific toys were not explored in previous studies. The benefit of examining parental attitudes is to aid our understanding of children's development of stereotypical or neutral gender behaviors. The current study surveyed parental attitudes towards gender, their observations of children's toys selections, and the toys they would purchase for their children. Children's toy preferences were assessed through interviews and real toy selection at school. Surveys were sent to parents of 62 children, between the ages of three and four. The preliminary data based on 35 returned surveys showed that parental gender attitudes were consistent with children's selection of gender specific toys. Mothers reported stronger gender stereotypical attitudes toward boys' choices of toys than fathers. Additional data analyses and results will be discussed at the conference. Further analysis is underway to determine the trend in larger data sets.

Analysis of Why RNase P Is Essential for Cell Viability in *Escherichia coli*
Liron Bar-Peled – CURO SCHOLAR
Dr. Sidney Kushner, Department of Genetics, University of Georgia

In *Escherichia coli* there are eight genes that encode tRNALeu, including leuU, which has been suggested to be essential for cell viability. LeuU encodes tRNALeu2, the tRNA that recognizes the leucine codons CUU and CUC.

In the *E. coli* chromosome, leuU is part of an operon, composed of itself and a protein-encoding gene, secG. Although the function of encoded leuU tRNA is well characterized, how it is processed into a mature tRNA is not well understood. However, two essential endoribonucleases, RNase E and RNase P, have been shown to be required for maturation of tRNAs. After verifying that the leuU gene was essential for cell viability, we hypothesized that if RNase P were required for generation of the mature of tRNALeu2, we might be able to suppress the lethality associated with the loss of RNase P by providing tRNALeu2 exogenously. Accordingly I constructed a plasmid in which the leuU gene was transcribed from an inducible promoter and would not require RNase P for its maturation. This plasmid was found to complement a leuU deletion strain but not a temperature sensitive RNase P mutant. The results suggest that the enzyme's essential function is not confined to the production of a single tRNA species.

Bollywood Fusion
Hariqbal Basi
Prof. Bala Sarasvati, Department of Dance, University of Georgia
Dr. Pamela Kleiber, Honors Program, University of Georgia

Bollywood Fusion is a compilation of a variety of music and choreography, both traditional and modern, with Indian influence. The piece begins with traditional pieces of music, to which I perform a knife dance wearing more traditional attire. This music has more subtle beats, played with traditional and basic sounds accented by drums. Towards the middle of the performance, the music changes to a remix of modern, westernized music complementing the traditional Indian singing. This demonstrates not only the westernization of modern Indian music but also the impact of the East on western pop-culture, since this section of music was actually taken from a Hollywood soundtrack (Moulin Rouge). The latter part of the dance is indicative of what would be found in a modern Bollywood film. This demonstrates the westernization of Bollywood and how Indian songs and choreography in modern films now incorporate modern, "electric" sounds and dance moves. The title of the piece reflects India's film industry (Bollywood) and the "fusion" of western and eastern culture. The flow of the piece from traditional to modern demonstrates the progressive introduction of "fusion" elements in the music and dancing and the gradual blending of cultures, becoming increasingly apparent through the performance.

Membrane Topology Studies of Rce1p
Shivan P. Bhatt – CURO APPRENTICE
Dr. Walter K. Schmidt, Department of Biochemistry & Molecular Biology, University of Georgia

A CaaX protein possesses the CaaX tetrapeptide structural motif: a C-terminal sequence comprised of the amino acid cysteine (C), two aliphatic amino acids (aa), followed by any amino acid (X). CaaX proteins fulfill important cellular processes such as signaling (Ras, Rac, RhoB), protein folding (Hsp chaperones), and fungal mating (*Saccharomyces cerevisiae* a-factor). This study focuses on Ras converting enzyme (Rce1p), an ER-localized membrane protease involved in the activation of the Ras signaling molecule. Ras is an important CaaX protein because hyperactive mutants of Ras are common in cancerous cells. Consequently, investigation of Rce1p membrane topology may assist in designing novel anti-cancer therapeutics. This study assessed fusions of a SUC2/His4C dual activity topology reporter attached to the C-terminus of 15 variously sized truncations of Rce1p. These Rce1p fusions were assessed for their glycosylation status after treatment with Endoglycosidase H and growth status on media containing histidinol. Reliable topology predictions for 10 fusions were included in the final assessment of Rce1p membrane topology. These topology predictions 1) provide empirical evidence for the existence of at least 7 Rce1p transmembrane spans and 2) highlight ambiguous regions of the protease as a focus for future topology studies.

A Genetic Exploration of Causal Factors Underlying Differential Recruitment Patterns in Chilean Barnacles

John C. Binford – CURO SCHOLAR
Dr. John Wares, Department of Genetics, University of Georgia

Recent studies have revealed a shift in the recruitment pattern of barnacles and mussels occurring at 32°-33° South latitude along the Chilean coastline. Populations north of this demarcation are characterized by decreased density and low recruitment rates compared to populations south of this proposed break. The objective of this project is to understand the dynamics of planktotrophic species, and, in turn, obtain a more holistic visualization of the marine communities along the South American coastline. The cause of these recruitment patterns is hypothesized to stem from the presence of selection factors or effects of physical oceanography. In order to distinguish between these two causes, we sequenced a 710 base pair fragment of the Mitochondrial Cytochrome Oxidase 1 gene in two species of barnacles, *Notochthamalus scabrosus* and *Jehlius cirratus*, in order to understand the nature of the gene flow present in these populations. Samples were obtained from six sites, including locations both north and south of the proposed ecological break. Statistical and phylogenetic analysis evidenced notably different patterns of genetic structure in each species. In *N. scabrosus*, genetic difference between northern and southern populations links recruitment rate and genotype, whereas *J. cirratus* is characterized by panmixia. The two species' different genetic structures reveal physical oceanography as an improbable primary cause of these recruitment patterns. Instead, it appears site-specific selection is partially driving the pattern in *N. scabrosus*. It is our hope that conservation efforts will be aided with this information, and nuclear genes are currently being analyzed to accompany this data.

O-GlcNAc Modifications in Obese Mouse Models

Kiya Birku
Dr. Lance Wells, Department of Biochemistry & Molecular Biology, University of Georgia
Dr. Ruth Harris, Department of Food & Nutrition, University of Georgia

Non-insulin dependent diabetes (type II diabetes) has recently become the leading cause of new cases of blindness in the United States as a result of retinal cell decay due to glucose toxicity. Contrary to the influential role that type II diabetes plays in today's society, the genesis of this epidemic has yet to be determined. However, it has been suggested that type II diabetes is an adaptation to nutrient excess and low energy expenditure. O-linked β-N-acetylglucosamine (O-GlcNAc) is a post-translational modification of intracellular proteins and is a proposed glucose sensor that mediates signal transduction cascades based on the metabolic state of the cell. Studies have shown that elevated levels of the O-GlcNAc modification on intracellular proteins induces insulin resistance, the distinguishing characteristic of type II diabetes, measured by glucose uptake in response to acute insulin stimulation. Testing for the abundance of O-GlcNAc modified proteins and the cycling enzymes in different organs of *db/db* K/O mice that are obese, leptin-and insulin-resistant will help us understand the relationship between O-GlcNAc and the diabetic state of the whole animal. Global O-GlcNAc levels, as well as the abundance of the cycling enzymes, will be evaluated in K/O and wt mice organs using western blot analysis.

Towards the Discovery of Ras-converting Enzyme Inhibitors: A Novel Oncogenic (Anti-cancer?) Target

Sarah R. Breevoort – CURO SUMMER RESEARCH FELLOW
Dr. Walter K. Schmidt, Department of Biochemistry & Molecular Biology, University of Georgia

The ultimate implication of this long-term project is the isolation of possible inhibitory compounds, which could potentially be developed as anti-cancer drugs. The proteases Rce1p and Ste24p promote a proteolytic step associated with the maturation of proteins containing a CaaX motif, where C is a cysteine, a is typically a small aliphatic amino acid, and X is one of several amino acids. Rce1p in particular is considered a chemotherapeutic target because of its crucial role in the maturation of Ras oncoproteins. Hyperactive forms of Ras are commonly associated with cancer, and thus inhibiting Ras maturation is proposed to disable, or at least moderate, its oncogenic activity. Because of the critical role Rce1p has in Ras processing, compounds that inhibit Rce1p would be lead candidates for a therapeutic drug. In this study, the inhibitory profiles of the Rce1p and Ste24p CaaX proteases using peptidyl(acyloxy)methyl ketones(AOMKs) and inhibitors identified by high throughput screening (HTS) are compared. It is concluded that AOMKs, although displaying better inhibitory properties than certain previously reported Rce1p inhibitors, are unlikely candidates for therapeutic drugs due in part to an inability to enhance potency. Nevertheless, several instances of selectivity for one CaaX protease over the other exist, which makes these compounds effective tools for investigating CaaX protease enzymology. The inhibitory profiles of compounds identified by HTS and their analogs are also evaluated and several appear to be potent Rce1p inhibitors. These compound analogs are farnesyl mimics, and are hypothesized to inhibit Rce1p activity by blocking the farnesyl binding pocket of the enzyme necessary for proteolysis of the substrate. These studies suggest that although AOMKs are unlikely drug candidates, certain farnesyl mimics are potent CaaX protease inhibitors that could be potentially developed as anti-cancer drugs.

Katanin Plays a Role in Microtubule Dynamics and Ciliary Assembly in *Tetrahymena thermophila*

Jessica M. Bryant – CURO SCHOLAR
Dr. Jacek Gaertig, Department of Cellular Biology, University of Georgia

The cytoskeleton is a dynamic structure that provides cell shape, motility, protection, organization, and division. Little is known about the *in vivo* regulation of the cytoskeleton, but it has been suggested that microtubule-severing proteins may play an important role in cytoskeleton dynamics. Katanin is an AAA ATPase microtubule-severing protein with a catalytic subunit, p60, and a non-catalytic subunit, p80. In order to study katanin's role in the ciliate *Tetrahymena thermophila*, a heterokaryon gene knockout was performed for each gene encoding a different subunit of katanin and the phenotypes were analyzed using immunofluorescence and electron microscopy. *Tetrahymena* has two genes that encode p60, KAT1 and KAT2, and one gene that encodes p80, KAT3. Cells lacking *Kat2p* appeared normal, while cells lacking either *Kat1p* or *Kat3p* showed multiple arrests in cytokinesis and had short, immotile cilia that lacked central pairs. This finding is supported by a previous experiment where flagella of *Chlamydomonas* lacking p80 lacked a central pair. *Kat1p* and *Kat3p* thus require each other for proper function of katanin. Cells lacking *Kat1p* or *Kat3p* also showed long, stable, acetylated microtubules in the cell body and long cortical microtubules, causing the mutants' arrest in cytokinesis, which suggests that *Kat1p* and *Kat3p* are required for microtubule-severing activity in the cell body of *Tetrahymena*. In addition, although assembly of basal bodies was normal in cells lacking *Kat1p* or *Kat3p*, assembly of cilia did not occur at every basal body, and cilia that were assembled were very short and lacked central pairs, rendering cells

immobile. This finding suggests that *Kat1p* and *Kat3p* also play a role in ciliogenesis. If further tests confirm a direct role of katanin in intraflagellar transport, this protein could be used to study ciliary diseases such as polycystic kidney disease.

Developing Synchronization Protocols in Ewes

Ashley C. Burch
Dr. William Graves, Department of Animal & Dairy Science, University of Georgia
(Ashley C. Burch, Dr. Clay Lents, Dr. William Graves, Joseph Durham)

Synchronizing estrus can increase reproductive efficiency of livestock. Information regarding estrus synchronization of sheep in the southeastern United States is lacking. The objective of this study was to compare two synchronization protocols under natural service conditions. On day -6 ewes were randomly assigned to one of the two treatment groups (n = 18 per group). Ewes in (PGF) on day -6 and -1. Ewes inαgroup 1 received 10 mg of prostaglandin F2 g of gonadotropin-releasing hormone on day -6 and on dayμgroup 2 received 100 0. Group 2 also received 10 mg of PGF on day -1. Plasma obtained from blood was collected on days -6, -1, 0 and 1. Plasma concentrations of progesterone were determined by radioimmunoassay (RIA). Treatment groups were replicated in two pastures using a single ram in each pasture. Each ram was raddled with paint crayons fitted to a harness, and estrus was determined by checking ewes daily for paint marks during the following 42 days of the breeding season. More ewes were in estrus earlier in group 1. Sixteen of the animals in group 1 became estrus during the first two weeks of the breeding season compared to 10 animals in group 2. Seven additional animals in group 2 became estrus in the third week of the breeding season. Lambing data is currently being collected. We conclude from these preliminary results that two injections of PGF 7 days apart are effective for estrus synchronization in sheep in the southeastern United States.

Construction of and Use of GAUT1 and GAUT7 Reporter Gene Constructs to Study GAUT1 and GAUT7 Transcriptional Activity in Plants

Amy J. Burrell
Dr. Debra Mohnen, Department of Biochemistry & Molecular Biology, University of Georgia

Pectin is a family of polysaccharides present in the cell wall of all plants. Pectin has many biochemical properties that contribute to plant growth and development. Homogalacturonan galacturonosyltransferases (GalATs) are enzymes that catalyze the transfer of galactosyluronic acid (GalA) residues from uridine diphosphate-GalA (UDP-GalA) to a growing pectic polysaccharide chain. One proven and one putative *Arabidopsis* GalAT, namely GAlactUronosylTransferase1 and 7 (GAUT1 and GAUT7), were recently co-identified through a proteomic approach using partially-purified, detergent-solubilized *Arabidopsis* membrane protein preparations. The objective of this project is to analyze where within the plant the GAUT1 and GAUT7 genes are expressed, with the goal of understanding the biological function of these genes in pectin synthesis. This will be accomplished through utilization of a reporter gene system known as β-Glucuronidase (GUS), which will be driven by the promoter regions of the GAUT1 and GAUT7 genes. The promoter regions of GAUT1 and GAUT7 have been amplified from genomic DNA of *Arabidopsis thaliana* suspension culture cells and inserted into the cloning vector pGEM-T-Easy. The sequences of the promoter regions are currently being verified by DNA sequencing. Upon verification of the sequences, the promoter regions will be removed from pGEM-T-Easy and inserted upstream of the GUS gene in the vector pBI101. The pBI101 vector harboring the promoter:GUS constructs will be transformed into *Arabidopsis thaliana* plants for analysis of the tissue and cell-type specific expression of each GAUT gene. The results of these studies will be reported and discussed in relation to the functions of GAUT1 and GAUT7 in pectin synthesis in *Arabidopsis*.

Sexual Selection and the Relevance of Female Choice in *Drosophila*

Charles P. Callihan
Dr. Wyatt Anderson and Dr. Yong-Kyu Kim, Department of Genetics, University of Georgia

The mate selection process depends upon the responses of females to various male cues. In this experiment, isofemale lines, wild-caught lines that have been individually maintained in captivity, of Drosophila were used to test the null hypothesis that Drosophila females randomly mate among males with the goal of understanding the process of mate selection, and in turn, the evolution of Drosophila. To test the prediction that mate selection in Drosophila is not random, virgin females were added to a clear glass cage with 14 marked males and were observed daily for five consecutive days. After copulation, the male was identified, and the number of mating events per male was scored. Prior studies have shown that 10% of males mated multiple times while 20% never mated; and that cuticular hydrocarbons were involved in selective mating. The results suggest that there is variation in mating success among males, cuticular hydrocarbon characteristics could indicate vigor and status, and that Drosophila females mate non-randomly. Beneficial genes are passed on to the next generations and, as a result, gene frequency will be changed in populations.

The Role of Hispanic Media in Athens-Clarke County

Colony C. Canady – CURO APPRENTICE
Dr. Leara Rhodes, Department of Journalism, University of Georgia

A growing Hispanic population in the Athens community raises the question of whether the Hispanic community is able to attain adequate community information in both their native Spanish language, as well as English. The Athens community's operation of only four Spanish-language sources, primarily radio stations, creates the need for a more diverse source of community information directed to this growing Hispanic community. This research presents the results of an analytic study on the importance and need for community-based media for the Hispanic media consumer in Athens-Clarke County through the analysis of local Hispanic media and the proposed development of a Spanish-language television program. To investigate the necessity of Hispanic community media in the Athens community, literature reviews were conducted, in which connections were made with previous research on related topics. Individuals participating in the proposed development of the Spanish-language television program in Athens and various members of the Athens community, including Grady College professors and community leaders, were then interviewed. Ultimately, a Hispanic newsletter was developed and disseminated to Hispanic members of the Athens community. Results suggest that community-based organizations, such as television programs and Hispanic publications, play a critical role in advancing the socioeconomic status of Hispanics and affording them the opportunity to feel included in the community, which can in turn, promote community relations and most importantly create a public sphere for information this community needs in order to make informed decisions within the community. Due to the closing of one Hispanic media source in Athens-Clarke County, Eco Latino Magazine, and the failure of the proposed television program, my research included an applied project based on the completed research of how Hispanics use media and the importance of Hispanic media. A newsletter, representing one aspect of the Hispanic community, was developed and in turn, was distributed by Sister Margarita of Oasis Católico to the Hispanic community of Athens and served as much needed source of current issues while promoting community relations.

Immobilization of Xyloglucan-specific Endo-β-1,4-Glucanase: Activity and Nectarin IV Inhibition

Kevin K. Chang
Dr. William York, Department of Biochemistry & Molecular Biology, University of Georgia

Xyloglucan is a highly branched, hemicellulosic polysaccharide present in the primary cell walls of vascular plants. Xyloglucan cross-links cellulose microfibrils in these walls, forming a dynamic network that expands in a controlled, oriented fashion, thereby regulating cell growth. Some plant pathogens secrete an enzyme known as xyloglucan-specific endo-β-1,4-glucanases (XEG) that specifically hydrolyzes xyloglucan chains. Xyloglucan-specific fungal endoglucanase inhibitor protein (XEGIP) is the only plant protein that has been shown to inhibit fungal endoglucanases and may play a key role in the plant's defense against fungal pathogens. Plant nectar contains an XEGIP ortholog called Nectarin IV (or NEC4), which binds to the fungal XEG, inhibiting its hydrolytic activity, thereby protecting the plant cell wall from enzymatic attack. The purpose of this study is to characterize immobilized XEG prepared by biotinylating the enzyme and binding it to magnetic beads. Catalytic activity of the immobilized XEG was demonstrated by the *p*-hydroxybenzoic acid hydrazide (PAHBAH) assay, which gives a colored product in the presence of reducing ends produced when the xyloglucan substrate is hydrolyzed. Reactions were also performed in the presence of NEC4 from tobacco nectar, showing that NEC4 binds to the immobilized XEG and inhibits it. The XEG-coated beads provide an experimental system for future experiments designed to bind, identify and isolate XEGIP orthologs and other plant proteins, including putative multiprotein aggregates, that are involved in the plant's resistance to microbial pathogens. Identification of such aggregates would provide invaluable insight into the mechanisms by which plant and animal cells defend themselves from pathogens.

Analyzing the Interactions of Acidic Matrix Polysaccharides with Cell Surface and Matrix Proteins Using Surface Plasmon Resonance

Chuan Cheng
Dr. Carl Bergmann, Complex Carbohydrate Research Center, University of Georgia

Glycosaminoglycans (GAGs) are naturally occurring, heterogeneous, negatively charged, and N- acetylated, unbranched polysaccharides. GAGs in the extracellular matrix have been extensively studied and contribute to the general structure and permeability properties of connective tissues. Pectins are acidic polysaccharides that are primary structural elements of the matrix of the plant cell wall, serving functions similar to GAGs within their respective organisms. Surface plasmon resonance (SPR) biosensors measure the mass concentration of biomolecules close to the surface of a sensor chip that is coated with a macromolecule such as a protein or carbohydrate (the ligand). Samples containing an analyte are passed over the bound ligand and the level of interaction (translating into a biomolecular mass concentration change) is proportional to the level of refraction of laser light that shines onto the sensor surface. The laser refraction increases with the interaction between ligand and analyte and these changes are used to analyze the binding affinity and kinetics of the interaction. SPR is an ideal tool with which to measure the interactions of various cell surface and/or extracellular proteins with pectins and GAGs. Here we describe the development of an appropriate method for binding the pectin or GAG to the surface of the SPR chip to allow the study of this important class of interactions. Data from such studies will further our understanding of pectins' implications in morphogenesis, wall permeability, and plant defense, and GAGs' implications in binding of pathogens to particular target cells, maintenance of cellular activities, and development of metastasis in cancer cells.

Indigenous Use of Medicinal Plants and Herbs by the Pavacachi Community of the Ecuadorian Region of the Amazon Rainforest
Disha Chhabra – CURO SCHOLAR
Dr. James Affolter, Department of Horticulture, University of Georgia

The Pavacachi community is an indigenous settlement on the shore of the River Curaray, in the heart of the Amazon rainforest of Ecuador. The community has a long history of subsisting on herbs and plant flora for primary health care. Ethnobotanical data were gathered over a four week period in which I lived within the community and interviewed two elders of the community, Alberto and Raul. The goals of this project included the scientific identification and classification of plants used by the community through visual identification of pictures taken in the forest. Also, I recorded the local names, uses, and modes of preparation of these medicinal plants. Finally, I performed a critical survey of medicinal plants in use in Ecuador today and analyzed how the Pavacachi pharmacopoeia fits within this larger context. Through this project, I documented data on more than thirty medicinally relevant plants that have been passed down the generations of the Pavacachi community and identified their place in the literature on the medicinal plants of Ecuador as a whole.

Strength in Numbers: Parasite Transmission and Virulence in Monarch Butterflies
Jean Chi
Dr. Sonia Altizer, Institute of Ecology, University of Georgia

The protozoan parasite, Ophroycystis elektroscirrha, infects monarch butterflies (Danaus plexippus). Parasite infection reduces fitness and longevity in monarch butterfly hosts, with higher parasite loads resulting in shorter host life spans. Because high infection levels (i.e. high parasite density) cause high virulence within the host, we tested if high infection loads are also advantageous to the parasite through increased transmission. Monarch larvae were infected with various doses of parasites and reared to adulthood, and parasite spores on milkweed leaves and eggs were counted. Results showed that heavily infected monarchs transmitted more spores onto leaves and eggs than lightly infected monarchs. When females laid eggs, they also transmitted more spores onto leaves than when they did not lay eggs. Spore counts taken from two dates did not significantly differ, suggesting that once a host is infected, the parasite can be transmitted over a certain time interval without decreasing in number. These results suggest that parasites require a high level of infection to transmit most effectively, and that host health deterioration is an unavoidable cost to parasite survival. This study supports a long held theory in evolutionary biology that parasite virulence can evolve as a trade-off of parasites optimizing their fitness.

Metrical Dissonance in Robert Schumann's Op. 39
Mark J. Chilla
Dr. John Turci-Escobar, Department of Music Theory & Composition, University of Georgia

Robert Schumann’s (1810-1856) Eichendorff "Liederkreis," Opus 39, is a cycle of twelve songs rich in musical complexity particularly in regard to rhythm, but lacking in overall unifying themes. Music theorist Harald Krebs has written several scholarly articles and books concerning rhythmic complexities, which he has referred to as “metrical dissonance.” With his analyses of Schumann’s music, he often favors the metrical dissonances of his piano music to that of his vocal music. Through analysis of the songs highly syncopated areas using the techniques set forth by Krebs, the paper will highlight the metrical dissonances of Schumann’s "Liederkreis" and show how the rhythmic complexities heighten the musical and extramusical expression. According to Krebs’ theories, metrical dissonances occur either as displaced accents or as unequal grouping layered upon each other. In the "Liederkreis," the dissonances can occur without any kind of direct textual connection, as in the piano postludes for many of the songs. However, how these metrical dissonances coincide with the text is of

particular interest. A striking dissonance can occur at a crucial textual point, providing "word-painting." Also, Schumann employs dissonances that occur over the course of an entire song, which helps to reflect the overall emotional effect. Highlighting the rhythmic complexities helps to clarify the music and text relationship while unifying the entire song cycle.

National Geographic Magazine: What Gets Covered Around the World?

Katherine B. Church
Dr. Leara Rhodes, Department of Journalism, University of Georgia

Once thought to be merely marketing tools, recent research has shown that magazine covers may be cultural artifacts which record a society's values and norms. To examine the role of magazine covers, a content analysis based on Sumner's methodology was conducted on five representative European editions of the National Geographic Magazine over a four-month time period (n=24). The investigation compared the European editions to one another and to the English-language original. All of the covers were analyzed according the type (human, animals, manmade objects, landscape, or nature) and theme (political nature, geographic scope, and scientific focus). It was hypothesized that the covers of the international editions, whose circulation relies predominantly on newsstand sales, would exhibit more of Sumner's five marketing tools than the covers of the English edition, whose circulation is mainly subscription-based. It was surmised that the international editions must appeal to a broader consumer-base, demonstrating more marketing tactics, whereas, the English edition could target a more narrow subscription-base. Despite a greater dependency on newsstand sales, the investigation showed that the international covers retained a quality of cultural distinctiveness, as determined by a literature review of cross-cultural communication, and were distinct from the English original. The inconsistency in results across geography and time demonstrates that magazine covers do indeed act as cultural artifacts. Therefore, magazine covers play a more influential social role than industry professionals believe. This study's results show that magazine covers have the power to preserve individual cultures despite the globalization of the media industry.

The Role of Non-resident Indians in Promoting U.S.-India Strategic Rapprochement

Benjamin T. Cobb
Dr. Seema Gahlaut, Center for International Trade & Security, University of Georgia

On December 8, 2006, the United States House of Representatives, in an overwhelming 330-59 vote, approved Senate amendments to House Resolution 5682, solidifying the Bush administration's historic deal to legalize nuclear trade with India. This legislation represents the recent culmination of six years of rapprochement strategy pursued by the White House. Bilateral convergence has been driven by a range of issues including security/terrorism, defense relations, trade, and technology security. While the sustained political effort in recent years has attracted international media attention, little credit has been given to the Indian-American community, whose efforts have doubtlessly played a critical role in fostering U.S.-India bilateral cooperation. This study provides a critical analysis of the Indian-American community's recent organized political efforts, unveiling successes and shortcomings in promoting U.S.-India strategic rapprochement. Special attention is granted to the U.S.-India Political Action Committee and the U.S.-India Business Alliance, which represent the interests of the nearly two million Indian-Americans to decision makers in both countries. To dissect this highly organized, complex lobby, the demographics of the Indian-American community are briefly discussed before outlining the historical rise of Diaspora politics. By highlighting the causes of political mobilization, the manifestations of political organization are better understood. This study also addresses a recent shift in Indian governmental policy, whereby the diasporic community has newfound leverage and support in promoting bilateral convergence.

The Repression of Dissent: Multi-Group Dissident Responses to State Repression in Burma, 1980-2005

Lauren Coffey – CURO SUMMER RESEARCH FELLOW
Dr. Stephen Shellman, Department of International Affairs, University of Georgia

My study seeks to explain dissident group responses to repressive governments. My study focuses on the repressive State Law and Order Restoration Committee (SLORC) or State Peace and Development Council (SPDC) regime of Burma/Myanmar and various dissident groups' responses to the regime. The SLORC regime took power in 1989 and is known for its harsh repressive policies. Numerous dissident groups including the All Burma Students Democratic Front (ABSDF), the Karen National Union (KNU) and Khun Sa's Mong Tai Army (MTA) exist in opposition to the regime. I seek to explain the behavioral relationships between the militant groups and the government by focusing on their day-to-day behavioral exchanges of conflict and cooperation. Primary data has been obtained from a search of English-language news reports through LexisNexis. The dataset generated from these news reports will be coded to generate multi-actor political event data. The project then employs several difference of means tests to determine how government repression affects the substitution of tactics by rebels over time. Specifically, the project compares the mean of each rebel group's behavior prior to repressive activities of the state and determines whether or not state repression succeeds at decreasing the mean hostile activities of each group. I expect to find that, once disaggregated, the multiple dissident groups will respond to the repressive activities of the state in a variety of ways. While some of the groups may meet state repression with increased levels of resistance, other dissident groups may offer their cooperation to the state. Traditional research on militant group responses to repressive regimes may be flawed and their statistical estimates biased since they aggregate all dissident groups' actions towards the state into a single variable. One of the aims of my research is to determine whether the practice used in previous research projects of aggregating all groups together influences the inferences we draw from statistical studies.

Flavor of Jude

Nikki Couppee
Prof. Rob Jackson and Prof. Mary Hallam Pearse, Department of Jewelry & Metalwork, University of Georgia

This piece is based on my interest in the portrayal of Catholic Saints, Byzantine mosaics and contemporary cult figures. In *Flavor of Jude,* Saint Jude is transformed into Flavor Flav with the blending of Flav's unique characteristics onto the patron saint. Jude is depicted in a blue background typical of mosaics, but capped with Flav's signature Viking hat. Jude's pendant of Jesus is replaced

with Flav's clock which also emphasizes the different time frames the two come from. The brooch is framed in a Palladian window signifying the importance of the patron saint. This piece was made using Cloisonné enameling techniques and fabricated with metals such as silver and brass.

Formulation of a Stable Acidified Dairy Beverage Containing Ellagic Acid

Rebecca Anne Creasy
Dr. Louise Wicker, Department of Food Science & Technology, University of Georgia

Acidified dairy drinks, such as Dannon® Frusion™, provide health-promoting nutrients and bacteria in a tasty, convenient product. The nutritional profile of these drinks can be further enhanced with addition of ellagic acid. Ellagic acid is a phytochemical that normalizes C-reactive protein levels linked to human inflammation. Ellagic acid is added to the dairy beverage in the form of muscadine skin. Within the beverage, skin particulates can interfere with interactions between pectin and casein micelles, decreasing beverage stability. Thus, the purpose of this research is to formulate and process a stable acidified dairy beverage containing ellagic acid. The treatment beverage will consist of yogurt made from milk, sugar, and non-fat dry milk powder fermented with a commercial *Lactobacillus bulgaricus* and *Streptococcus thermophilus* starter culture. A 0.6% pectin solution will be formulated from apple juice, sugar, and pectin. Dried muscadine skin and seed, yogurt, and pectin solution will be mixed (final pectin concentration of 0.3%) and homogenized at 5000psi. Homogenized beverage will be thermally processed at 190°F and pumped into sterile bottles. This process will be repeated for control yogurt beverage, omitting addition of muscadine skin. Stability of treatment and control yogurt drinks will be determined with a 90-day chilled storage study. During the 90-day study, particle size and sedimentation analysis, turbidity measurement, and BCA protein assay will be conducted as measurements of beverage quality. Results from the physical measurements for treatment and control beverages will be analyzed to determine if stability can be increased with formulation modifications.

Studies of Hirano Bodies and Oxidative Stress in Neuroglioma Cells

Caelin A. Cubeñas – CURO SCHOLAR
Dr. Marcus Fechheimer and Dr. Ruth Furukawa, Department of Cellular Biology, University of Georgia

Hirano bodies are paracrystalline F-actin aggregations associated with a variety of conditions including aging, Alzheimer's, Parkinson's, diabetes, and other diseases. The physiological function of Hirano bodies is unknown. An *in vitro* model for Hirano body formation was developed by expressing mutated forms of the 34 kDa actin-bundling protein (Maselli, et al., 2002, 2003). The altered forms of the protein are termed CT, the carboxyl-terminus (aa 124-295) which lacks an amino terminal inhibitory region, and ΔEF1, which has mutations that affect intramolecular domain-domain interaction. Both forms exhibit activated actin bundling that causes formation of Hirano bodies. Because Hirano bodies are associated with aging and late onset diseases in which oxidative stress is implicated as a major factor, we investigated possible relations between oxidative stress and Hirano bodies. Experiments were conducted in WT (wild-type) H4 neuroglioma cells, and H4 cells transfected with either the enhanced green fluorescence protein (EGFP) or CT-EGFP. Application of oxidative stress results in formation of numerous Hirano bodies visualized by fluorescence microscopy. The viability of cells with and without Hirano bodies was assessed 24 hours after application of oxidative stress. All cells lines showed increased cell death with either increasing H_2O_2 or menadione sodium bisulfite concentrations. The cells expressing CT-EGFP had a significantly greater level of death, indicating that Hirano bodies increased cell susceptibility to oxidative stress. Pretreatment of the cells with the anti-oxidant N'N-dimethyl-thiourea restored cell viability to control levels in all cell lines, indicating that the cell death was caused by

oxidative stress. Future experiments will investigate mechanistic details of these findings to better understand a possible relationship between Hirano bodies, oxidative stress, and late onset diseases.

Association between Infant Feeding and Body Composition
Kimberly B. Cunningham
Dr. Alex Anderson, Department of Food & Nutrition, University of Georgia

Obesity and overweight are increasingly becoming public health problems here in the US and the rest of the world. Early and long-term preventive measures are urgently needed to fight this epidemic. The purpose of the study was to examine types of infant feeding and how they affect the mother's and the infant's body composition using the "BOD POD and PEA POD body composition systems," respectively. Pregnant women were recruited in the Athens area and followed through 12 weeks postpartum. Body composition of the mother was monitored at 36 weeks gestation, and through the first 12 weeks postpartum. The infant's body composition was monitored through 12 weeks postpartum. Subjects were interviewed for information on infant feeding practices, dietary practices and food habits, and other biomedical indicators. Results indicate that exclusively breastfeeding infants had higher percent body fat than mixed fed infants at 2 weeks postpartum. Exclusively breastfed infants were significantly longer than mixed fed infants ($p<0.05$). Although exclusively breastfed infants had significantly higher percent body fat earlier in life compared to mixed fed infants, this significant difference disappeared by 3 months postpartum. This result may suggest that exclusively breastfed infants obtain more fat from breastmilk, which is then used as a source of energy needed for the rapid growth during the first few months after delivery. Continued study of infants with respect to their feeding practices into adolescence will be necessary to fully understand any long-term effects of breastfeeding in the prevention of obesity and overweight in the United States.

Awareness of Student Expenditure Patterns
Bryan P. Davis – CURO APPRENTICE
Dr. Lance Palmer, College of Family & Consumer Sciences, University of Georgia

This research focuses on student expenditure patterns at the University of Georgia. Literature on student debt and student consumption choices indicate that many college students regret consumption decisions made during college and would choose differently if they could do it over. However, many college students may not be sufficiently aware of potential spending problems, thus limiting their ability to change their spending behavior. This research model utilizes the Transtheoretical Model of Change, which provides a foundation for articulating and measuring how individuals make behavior change. This research will assess how aware students are of their consumption patterns. The sample is a 300-person elective course, which should cover many demographics, ages, and cultures of students. Since the sample size is so large, it should eliminate any size-related bias from our results. Students will complete an initial survey and questionnaire assessing their estimated spending behaviors as well as their readiness to change spending behavior. Students will keep track of their expenses regularly, using a secure website. Through this research, we hope to gain insight on how aware UGA students are of their spending behavior.

Sexuality in Israel: Birth of the Gay Rights Movement and its Struggles for Acceptance in Israeli Society
Michael W. Davis – CURO SCHOLAR
Dr. Randy Sturman, Department of Religion, University of Georgia

In 1988, the Israeli Knesset voted to repeal Israel's sodomy law. Over the following two decades, gay rights advocates succeeded in expanding gay rights within the overtly Jewish state. These successes included the Knesset vote to outlaw workplace discrimination based upon sexual orientation in 1994 and the Israeli Supreme Court decision stating that a lesbian had the right to adopt her partner's child in

2005. Such successes positioned Israel as the most progressive Middle Eastern state on gay rights issues. Yet full marriage equality has not been achieved, and questions still linger over the place of homosexuals in a society dominated by Jewish tradition, mandatory military service, and the Arab-Israeli conflict. This paper analyzes the formation of the gay rights movement in the context of Israel's unique history as a Jewish democratic state. More specifically, this paper explores the discrepancy between the advances of the movement on the one hand and the actual lives of gays and lesbians within Israel on the other. Israeli films and memoirs are examined for evidence of the alternate acceptance and discrimination that homosexual individuals, both Israeli and Palestinian, experienced as the Israeli state officially expanded rights and protections for said individuals. Special attention is focused upon the issue of homosexuals within the Israeli military and gay relationships between Israelis and Palestinians.

Mechanisms of Bromide- and Bromate-induced Kidney and Liver Cell Death
Dilhara T. De Silva – CURO APPRENTICE
Dr. Brian S. Cummings, Department of Pharmaceutical & Biomedical Sciences, University of Georgia

Bromide and bromate are by-products of the ozonation water purification system and are commonly found in drinking water. The mechanisms of bromide (Br-)- and bromate (BrO3-)-induced death in Normal Rat Kidney (NRK) and liver cells (CRL1469) was investigated. Both BrO3-, (added as KBrO3) and Br- (added as NaBr) induced concentration-dependent decreases in MTT staining after 48 hours in kidney and liver cells. BrO3- reduced MTT staining at lower concentrations (0.1 to 1.6 mg/mL) than Br- (1.6 to 25.6 mg/mL). Cell morphology analysis demonstrated that 0.2 mg/mL BrO3 altered kidney cell morphology, compared to 0.8 mg/mL in liver cells. The role of the sodium iodide symporter (NIS) in cell death was investigated by treatment with the NIS inhibitor NaClO4 (20 mM) prior to BrO3- or Br- exposure. NaClO4 increased MTT staining in kidney but not liver cells. The effect of BrO3- and NIS on annexin and PI staining and cell cycle were also determined. BrO3- exposure increased both annexin V and PI staining in tandem, suggesting that cell death was primarily mediated by necrosis. Cell cycle analysis demonstrated that BrO3- exposure doubled the percentage of cells in G2-M, which was not inhibited by NaClO4. These data demonstrate that BrO3- and Br- cause concentration-dependent death in kidney and liver cells, that BrO3- is a more potent toxicant than Br-, that kidney cells are more susceptible to BrO3--induced cell death than liver cells, and suggests that the mechanisms of BrO3--induced cell death involves both a G2-M arrest and NIS.

The Rise of Political Islam in East Africa
Breonne T. DeDecker
Dr. Stephen Shellman, Department of International Affairs, University of Georgia

The goal of this project is to explore the development of Political Islam throughout the Muslim populations of several East African states. The intent is to identify historical and cultural forces in each society that could inform the trend towards the politicization of Islam within the region over the past few decades. The central theme is the historical context in which the radicalization of Islam has taken place, and what common trends can be identified. Methodology was primarily comparative historical analysis, with emphasis on understanding the evolution of the political climate in each state from the colonial period until the present. This paper seeks to understand the common trends of ethnic divisions between Arab and African populations and the subsequent rise of Political Islam within three states: Kenya, Sudan, and Somalia. The states were chosen based on their geographic relationship, cultural relationship, susceptibility of penetration by modern terrorist organizations, and the interplay of ethnic groups within their borders. The focus is on evolutionary time periods within each state in regards to the politicalization of Islam. These evolutionary periods include Islamic revolutions against

colonial domination, increased ethnic violence along religious lines due to competing territory claims, establishment of religious hierarchies within government access and education, and failed attempts at democratization.

Analysis of the Self-serving Bias Using EEG
Vanessa N. del Valle – CURO APPRENTICE
Dr. W. Keith Campbell, Department of Psychology, University of Georgia

The self-serving bias is the tendency of individuals to attribute negative outcomes to external factors and attribute positive outcomes to internal factors. Campbell and Sedikides (1999) described self-serving attributions as a preservation technique to heighten the image of the self in one's own eyes. The current study sought to replicate past research, predicting that participants would make self-serving attributions subsequent to false feedback in an adapted working memory task. Participants completed multiple questionnaires which measured various personality components that contribute to demonstration of the self-serving bias such as narcissism, depression, locus of control, and self esteem. Participants then completed a computer task which they were told was a memory task using working memory for face recognition. False feedback was administered to create equal numbers of failure and success conditions. Participants then attributed their "failure" or "success" to a forced choice between internal or external attributions. Internal and external attributions were further classified as stable or unstable. Using electroencephalography (EEG), brain activation was measured during the working memory task, during the 500 milliseconds before the attribution responses (biased or unbiased) were made. As hypothesized, individuals made significantly more self-serving responses following both positive and negative feedback. Preliminary analyses revealed more prefrontal cortex activity after participants received negative feedback preceding unbiased responses.

The Economic Implications of a Marijuana Decriminalization Policy in the United States
William Patrick Dever – ROOSEVELT @ UGA
Dr. William Lastrapes, Department of Economics, University of Georgia

Theory dictates that "successes" in US marijuana enforcement only lead to higher revenues for marijuana dealers, who are also responsible for funding other crimes. Furthermore, Miron reports that $5.3 billion by state and local governments and $2.4 billion federally are spent on marijuana enforcement (8, 10). Nevertheless in 2005, 16.9% of all Americans admitted to using marijuana within the last year (National Household Survey on Drug Use and Health). Thus this large sum has very little effect on the demand for marijuana and actually raises the cost to society. Therefore both in theory and in practice, the United States policy of marijuana prohibition is ineffective. A policy of decriminalization, under which the penalties for the production, sale and consumption of marijuana are lifted, should be implemented. Admittedly, a decriminalization policy can be reasonably expected to result in a relatively small increase in the amount of marijuana consumed, but would increase the total economic welfare as well as open up this whole market to safer governmental regulation and tax. To estimate the amount of revenue that could be received from a marijuana tax, the total yearly amount of consumption must be found and then treated like cigarettes for tax purposes. Even if no additional consumption occurred and marijuana is taxed at a rate comparable to cigarettes, the amount of government revenue to be gained would be approximately $125 million federally and $314 million for the states. This additional tax revenue should be used for both marijuana education and treatment to help to curb drug abuse and increase public awareness of possible health risks.

The Stability of Children's Gender Toy Preference through a Two-year Longitudinal Study

Sara Douglass, Kelli Webb, Matthew Anderson, Ankita Patel & Jeramy Denton
Dr. Tsu-Ming Chiang, Department of Psychology, Georgia College & State University

Children's use of gender cues is evident through socialization. At an early age, they begin to identify with a specific gender and build gender stereotypes. They further use these gender cues to guide their understanding of immediate contexts, and to build sex-typed behaviors accordingly. The socialization of gender is, in turn, often revealed by children's toy preferences. Understanding the stability of children's selections of gender-stereotyped toys would help educators and parents in understanding how children develop gender-specific behaviors. This project is aimed towards documenting the stability and changes of children's toy preferences over a two-year period. Forty-two children (girls = 30) were recruited from a county Head Start program, and were interviewed at age 3. Children were first asked to name one of their favorite toys verbally. A box containing masculine (e.g. a male firefighter as an action figure, a ball, a truck, a white stuff animal), feminine sex-typed toys (e.g. a baby doll, a Polly doll, a pink stuff animal) and neutral toys (e.g. a book, a star box which contained their favorite toy) were presented to children individually. Children were then asked to point to the toy they preferred. Two follow-up tests with the same procedure were used to document the preference changes. The preliminary results showed that boys developed gender-stereotyped behavior earlier than girls by frequently choosing toy truck and ball. In addition, the toy preference is very stable in boys earlier on, while girls do not become consistent until they turn four years of age.

Environmental and Ontogenetic Changes in Detection Probability of Pond-Breeding Salamanders in the Georgia Piedmont

Andrew M. Durso – CURO APPRENTICE
Dr. John Maerz, Department of Forestry Research, University of Georgia

Amphibian declines have prompted research into effective means to monitor amphibian populations. As estimates of species abundance are costly, presence-absence data are more frequently used for landscape-level monitoring efforts. Because aquatic salamanders are difficult to sample using opportunistic methods, the implications of using alternate sampling strategies to estimate patch occupancy must be rigorously assessed before these estimates can be considered valid. Estimates of detection probability are necessary for accurate interpretation of trends based on these data. Eight wetlands in Clarke County, Georgia were intensively sampled for pond-breeding salamanders using aquatic traps and opportunistic searches, to test effects of season, sympatry and pond permanence on detectability. Using program PRESENCE, detection probability was estimated for neotenic and adult forms of these species in fall, winter and spring. The amount of sampling effort required to infer absence with 95% confidence for each species was also estimated to obtain an index of survey quality. Inter- and intraspecific variation in detectability across wetlands were compared. Expected correlates between detection probability and wetland characteristics included a positive association between pond ephemerality and presence of neotenic forms, a negative interaction between adult *Notophthalmus* and *Ambystoma* larvae, and seasonal effects concurrent with known breeding intervals. These results emphasize that extensive effort must be employed to infer absence of cryptic species, so that their presence is not overlooked in conservation and management decisions. The importance of incorporating parameterized detection probabilities into patch occupancy estimates is crucial when species negatively impact one another or are absent in some seasons.

The Effects of Antibiotic Use in Food Animals and the Prevalence of Tetracycline Resistance in Bovine Gastrointestinal Commensal Bacteria

Jodi L. Dyer
Dr. Susan Sanchez, Athens Diagnostic Laboratory, University of Georgia

Multi-drug resistant (MDR) bacteria are rapidly becoming a threat to medicine worldwide. The genes that confer antibiotic resistance are carried within the chromosome of bacteria or on mobile genetic elements, on which the bacteria may be capable of exchanging these genes, even interspecially. Often bacteria harboring these genes contain resistance to multiple antibiotics. *tet(A)*, a gene conferring resistance to tetracycline, is one example of a gene that is often clustered with other genes on a single conjugational plasmid within some bacterial strains. The objective of this study was to determine the prevalence of *tet(A)* in both *Salmonella* and lactose-fermenting *Enterobacteriaceae* isolated from fecal samples of dairy cattle located on three geographically separate farms, which were selected because of the therapeutic use of antibiotics that was made available on these farms. Gene-specific screening was performed, and on each farm, the lactose-fermentors demonstrated a carriage rate of 24% or higher, potentially indicative that selection of these MDR bacteria is occurring through therapeutic antibiotic use. In contrast, only a single farm contained *Salmonella* isolates carrying *tet(A)*. The similarity between the *Salmonella* and lactose fermentors on this farm, a 62% to a 64% carriage rate, respectively, suggests that gene transference may be occurring between species within the animals. Given that many food contaminants are derived from fecal material, the development of antibiotic resistant bacterial reservoirs in food animals may be contributing to the increase of resistant strains causing disease in humans, increasing the difficulties of medicinal treatment.

Plasse

Rachel Egger
Prof. Susan Roberts, Department of Graphic Design, University of Georgia

This piece of work began as a mission to come up with an idea for a restaurant that would have a particular environmental concern and to design its menu with this concern in mind. My personal interest in reducing the negative impact of the automobile developed into Plasse, a hypothetical restaurant with a casual atmosphere that would promote bike riding and alternative transportation in general. The name Plasse, which rhymes with "toss," was derived from the Norwegian word for space and ground. I chose this language because Norwegians are known to

have a deep interest in enjoying and preserving the environment. I began designing the menu with many photographic ideas in mind, but after weeding out many of them I decided to work strictly with Adobe Illustrator to create simple vector graphics from scratch. I wanted the piece's imagery to have a clean feel, which led to its white space, limited color palette, and simple representations of bikes and roads. I took the dotted line and carried it throughout the menu to draw together the text and bicycle parts. For the cover I decided to carry this road theme a step further by actually making the word Plasse abstractly create the dotted line effect over a black background. Once the menu cover and interior were finished, I designed a few promotional items for patrons to use at Plasse and possibly take home with them, including a design for a water bottle. The bottle would fit in a bicycle's bottle holder and could be filled with any drink at a discounted price. The dotted line and simple color scheme were carried throughout each piece to bring them together under the Plasse brand.

Calmodulin Activation of Estrogen Receptor α: Cloning and Expression of a Fusion Protein for Defining the Calmodulin Binding Determinants

Madeline C. Elliott, CURO SCHOLAR
Dr. Jeffrey L. Urbauer, Department of Biochemistry & Molecular Biology, University of Georgia

Estrogen dependent breast cancer, accounting for approximately 70% of all breast cancer tumors, requires estradiol-17β (E_2) bound to the estrogen receptor α (ERα) to thrive. One of the most common treatments for estrogen dependent breast cancer is antiestrogen hormone therapy using the drug tamoxifen (TAM). In breast cancer tumors, TAM binds ERα, deactivating it. Initial treatment with TAM is effective, but over time, resistance to TAM is acquired and the cancer reappears. The precise mechanism by which TAM deactivates ERα or resistance to TAM develops remains unclear. It has been demonstrated that calmodulin (CaM), an important signaling protein, binds ERα and is required for normal ERα transcriptional activity. Because TAM also binds CaM, it is possible that TAM inhibits ERα function by attenuating CaM activity. As a first step towards elucidating the mechanism of ERα activation, and the role played by CaM, it is essential to define the CaM binding site(s) on ERα. We successfully cloned a segment of the ERα gene (residues 241-320) that we believe contains the CaM binding site(s). We then overexpressed it as a thioredoxin fusion protein, purified it using column chromatography, and most importantly, demonstrated binding to CaM, confirming that our protein contains (a) CaM binding site(s). Successful production of this protein permits delineation of the precise CaM binding site(s) on ERα and allows for future studies that explore how modifications to the site(s) on ERα affect binding and activation by CaM. More effective treatments then may be devised to treat or prevent resistant tumors.

The Marriage of Expression and Design

Hsuan Ju Susan Fang – CURO SUMMER RESEARCH FELLOW
Prof. Christopher Hocking, Departments of Studio Foundations and Drawing & Painting, University of Georgia

As an art student, I have long admired the works by the great Expressionists, from Beckmann to de Kooning, and as a design student I'm deeply captivated by contemporary graphic design and illustration, yet very seldom had I combined the two worlds. The goal for the CURO Summer research was to marry two of my inspirations, expressionism and graphic illustration, creating works that incorporate elements and principles from the two styles. With the art world changing and our visual culture growing, I feel that a crossover between the two worlds is inevitable, if not already present, which makes the research that much more important in furthering my artistic ambitions. My work was achieved through the technique *pentimenti.* By layering loose and improvised curvilinear lines and then covering it with a thin layer of paint, I am able to create a ghost image from which another layer is based, and create a painterly surface. The process of building and blocking out layers allows for me to find the medium between the depth of expressionism and the flatness of graphic illustration. The act of making improvised lines forces me to think about the composition as both expression and design, in which I edit my own brushstrokes for the sake of aesthetic unity. I have a strong attraction to the chaotic canvas, with clustering bold line work and letter stencils, but in keeping with a design mentality I wanted to find a way of controlling the chaos. By limiting and controlling my color palette and adding in areas of solid color I am able to achieve an environment of controlled chaos.

Influence of Bivalves on the Persistence of Avian Influenza Virus in Water

Christina L. Faust
Dr. David Stallknecht, Department of Infectious Diseases, University of Georgia

Although the transmission of avian influenza virus (AIV) is dependent on an indirect fecal-oral route involving fecal-contaminated water, little is known about the persistence of AIV in aquatic environments. Studies have shown that the infectivity of AIV is temperature, pH and salinity dependent; however, biotic factors have not been studied. The objective of this study is to examine the influence of filter feeding bivalves on the infectivity of AIV in water. In experiments, freshwater clams, *Corbicula fluminea*, were used as model bivalves and collected locally. For each trial, clams were rinsed and individually placed in tissue culture flasks (n=20) containing distilled water that was inoculated (1:100) with a low pathogenic avian influenza virus. Water samples were taken a minimum of three times during 48 hours, and after each trial the clams were processed for microscopic examination with immunohistochemistry (IHC) and *in situ* hybridization. The virus titer of the water samples was quantified by titration in primary cultures of chicken embryo fibroblasts. The virus titer decreased (compared to control flasks) or was undetectable in all 20 flasks where clams

were present. Rapid decreases in virus titers at varying time points suggested the decrease in titer was due to water filtration by clams. The results of this study suggest that biotic factors within the environment, specifically filter feeders, impact the persistence, and thus infectivity, of AIV. Studying the impact of filter feeders on the epidemiology of AIV will help develop an understanding of the maintenance of AIV within wild aquatic bird populations.

The Interaction of Natural Killer Receptor + T-cells with *Campylobacter jejuni*
Yayne Fekadu
Dr. Joan O'Keeffe, Department of Biochemistry, National University of Ireland, Galway

Natural Killer receptor+ T cells (NKR+ T-cells) are a unique subpopulation of T-cells that share characteristics of Natural Killer cells. This subpopulation of cells recognizes self and foreign glycolipids presented by CD1d. Their ability to rapidly produce cytokines led scientists to believe that NKR+ T-cells may have a role in infection and immunity. The aim of this study was to investigate the effects of lipopolysaccharides (LPS) derived from *Campylobacter jejuni* on NKR+ T cells from human peripheral blood using flow cytometry and ELISAs. Peripheral blood mononuclear cells were stimulated with *C. jejuni* LPS fractions (HS:2, HS:3, HS:4, O:19, O:23, and HS:41) for 24, 48, and 72 hours. Activation marker expression (CD25) was studied on NKR+T cells by flow cytometry and IFNγ levels measured in culture supernatants using ELISA. The results showed that all of the LPS fractions used increased CD25 expression on NKR+T cells after 48 hours in culture. IFNγ levels were also increased upon stimulation with each of the LPS fractions tested. In conclusion, the responses of NKR+ T cells to *C. jejuni* may be important in diseases associated with infection. Further studies are warranted.

Characterization of Putative Genes that Encode the Enzymes Arabinose Kinase and Galactose Oxidase: Enzymes Involved in the Biosynthesis of Sugar Nucleotides
Zion Firew
Dr. Maor Bar-Peled, Department of Plant Biology, University of Georgia

The defining feature of plants, the cell wall, affects all aspects of plant morphology, growth and development. Cell walls surround the plant cell and provide structural support and protection. They play vital roles in our environment and society in their use as a source of food, fuel and fiber. They are complex structures made up of polysaccharides, proteins and lignin. The major polysaccharides in the primary cell walls are cellulose, hemicellulose and pectin. Pectin contains three major polysaccharides that are thought to occur in all primary cell walls, and these are homogalacturonan, rhamnogalacturonan-I and rhamnogalacturonan-II. The main objective of this ongoing project is the biochemical characterization of the enzymatic roles of several putative enzymes involved in the synthesis of nucleotide sugars and polysaccharides. Nucleotide sugars are activated monosaccharides used to synthesize polysaccharides. Some of the major identified sugars that make up this cell wall include glucose, rhamnose, galactose, xylose, arabinose, and galacturonic acids. Our lab studies candidate genes that may encode enzymes that catalyze the synthesis of sugar nucleotides. Our model plant of study is *Arabidopsis thaliana* whose genome sequence is known. However, the study of function of all the genes is still lagging behind. In this project, the identified gene Ara1, for Arabinose Kinase and novel gene, at3g5359, which is a putative galactose oxidase (GalO) are studied and characterized to understand their role in the biosynthesis of polysaccharides. Arabinose Kinase catalyzes the phosphorylation of the arabinose sugar into arabinose-1-phospate. Though this activity was studied before, it is unknown if this catalytic activity is specific only for arabinose. The putative galactose oxidase gene is going to be

characterized both *in vivo* and *in vitro* to analyze its function in the synthesis of sugar nucleotides. This project will focus on the verification of the genes, and the process of cloning and characterizing to study its function.

Mathematical Computing: Exploring the Relationship between the Critical Group and Structure of Graphs
Grant M. Fiddyment
Dr. Dino Lorenzini, Department of Mathematics, University of Georgia

In mathematics, a graph is a collection of vertices and edges between them. The number of spanning trees of a graph is a standard invariant attached to it. It turns out that this integer is, in fact, the number of elements in an algebraic structure associated with the graph called the critical group. Although this group has applications to economics and physics, the precise relationship between the algebraic structure of the group and the combinatorial properties of the graph is not yet well understood. For instance, the simplest possible group structure is the one where the group needs only one generator – that is, it is cyclic. It would be interesting to understand how often the critical group of a graph is "as simple as possible." As part of the Vertical Integration of Research and Education (VIGRE) Graph Theory Group, several approaches to this problem have been studied, including calculation of the Smith-Normal form of the graph's Laplacian as well as computer-assisted computation. In particular, using the published list of the millions of graphs with at most 11 vertices, a comprehensive list of the explicit structure of the critical group of these graphs is being created using the computer software "nauty" and Maple. This work required writing Maple procedures to compile data, later refined to take into account the sheer size of the input. A statistical analysis of this data, which will hopefully provide some insight on how often critical groups are cyclic, will be presented.

A GP-evolved Formulation for the Relative Permittivity of Water and Steam
Sergey V. Fogelson
Dr. Walter Potter, Department of Computer Science, University of Georgia

The relative permittivity (or static dielectric constant) of water and steam has been experimentally calculated at a relatively wide range of temperatures and pressures. Two separate functions for predicting the relative permittivity of water and steam in three distinct thermodynamic regions were evolved using genetic programming. A data set comprised of all of the most accurate relative permittivity values, along with temperature, pressure, and density values from the entire experimentally calculated range of these values was used for this task. The accuracy of these two functions was evaluated by comparing the values for the relative permittivity obtained using the GP-evolved functions and the values obtained using the latest dielectric constant prediction equation to the experimentally obtained data set. In all regions, the newly evolved functions outperformed the latest dielectric constant prediction equation in terms of difference between calculated and experimentally obtained values for the dielectric constant. This work heralds the successful beginning of applying AI techniques to this important scientific application area.

A Cellulosic Ethanol Plan for Athens
Zach Fox – ROOSEVELT @ UGA
Dr. Thomas Adams, Department of Biological & Agricultural Engineering, University of Georgia

The U.S. transportation sector's reliance on fossil fuels increases American dependence on foreign oil, pollutes our air, contributes to global climate change, and is generally unsustainable. An alternative to fossil fuels is cellulosic ethanol which is a cleaner-burning fuel blended with conventional gasoline and may be produced from biomass. Mixed-stream paper, consisting of newspaper, office paper, and other discarded paper products, is readily available biomass in the University of Georgia community and will

serve as the raw material for ethanol production in this proposal. This paper proposes a comprehensive plan to be implemented to increase research on and production of cellulosic ethanol. The objectives of the plan are to 1) provide University vehicles with cleaner burning ethanol-blended fuel and 2) decrease waste streams of paper to local landfills and recycling centers. The success of this plan hinges upon implementation of three interdependent plans of actions: 1) completion of a facility capable of pilot-scale ethanol production; 2) a stronger university-wide recycling initiative implemented to ensure a reliable, consistent supply of feedstock; and 3) an increase over time of the quantity of ethanol blended with gasoline corresponding to the production capabilities of the research facility. By coordinating varied parties and interdependent initiatives, this plan ultimately will provide University vehicles with a clean fuel alternative, increase campus recycling efficiency, and promote scientific and commercial advancement of cellulosic ethanol. Furthermore, using Athens and UGA as a model, we seek to demonstrate this plan's applicability to the nation.

Investigation of the Genetic Population Structure of the Canine Hookworm, *Ancylostoma caninum*

Mary B. Gassama
Dr. Ray Kaplan, Department of Infectious Diseases, University of Georgia

Hookworms are intestinal nematode parasites that feed on the blood of the host, resulting in various ailments such as iron-deficiency anemia and malnutrition causing stunted growth and mental retardation in children. Mass treatment of communities with anthelmintic drugs can greatly reduce morbidity and infection prevalence, but also bears the danger of selecting resistant alleles, which could render whole parasite populations irresponsive towards the drug. To investigate the development and spread of resistance, it is necessary to understand the population structure and genetics of hookworms. This project is focused on population genetics of canine hookworms as a model for human hookworms. In order to get a better understanding of the population genetics of hookworms, it is necessary to analyze hookworm DNA. DNA genetic markers, isolated from adult hookworms and eggs samples and amplified by PCR, are analyzed for allele changes. Parasite populations and relations between them are estimated by bioinformatics approaches. Finally, presence of resistant hookworms will indicate a need to adjust the method currently used to administer hookworm treatment drugs.

Effects of 8-2 Fluorotelomer Alcohol on Gene Expression and Pregnancy Outcome in Mice

Gabrielle D. Gay – CURO APPRENTICE
Dr. Mary Alice Smith, Department of Environmental Health Science, University of Georgia

8-2 fluorotelomer alcohol (FTOH) and its stable metabolites, perfluorooctanoic acid (PFOA) and perfluorononanoic acid (PFNA), are developmental toxins that result in early pregnancy loss as well as poor neonatal growth and survival. Previous work in our laboratory has determined that treatment with 8-2 FTOH results in neural tube defects (NTDs), manifesting as either anencephaly or exencephaly in CD-1 mice. The objective of our current study was to investigate the mechanism of NTD induction by 8-2 FTOH using the inbred LMBc mouse. These mice are highly susceptible to birth defects due to genetic alterations in sphingolipid biosynthesis, which regulates both cell growth and cell death. Pregnant LMBc mice received a single gavage dose (30 mg/kg·BW 8-2 FTOH) on gestational day (GD) 8. Mice were sacrificed on GD15 and tissues excised for analyses. Subsets of fetal and placental samples were fixed in RNAlater® for gene expression analysis with RT-PCR. Preliminary data suggest that following treatment, maternal weight gain was not affected by 8-2 FTOH. However, 8-2 FTOH resulted in both increased absolute and relative liver weight in treated dams. Treated dams had an increased number of late-stage resorptions, thus decrease in litter size (75 % incidence). Our data suggest that LMBc mice,

unlike the previously studied CD-1 mice, are more likely to abort affected fetuses. Future work will include looking at gene expression alterations in pathways governing metabolism, growth and development, as well as stress and toxicity.

Escalation or Acquiescence? An Analysis of Sequential Dissident Responses to Repression in Indonesia

Andrew I. Gladden & Patrick Bentley
Dr. Stephen Shellman, Department of International Affairs, University of Georgia

This study evaluates the relationship between government repression and dissident tactics. It is based on statistical data collected from Indonesia through Project Civil Strife under the direction of Dr. Stephen Shellman. It is important to note that the particular country chosen is not what is being studied. Instead, the goal is to apply a new statistical test to the government-dissident data from this country. This test, known as a difference of means test, begins by assigning values to particular events based on a spectrum ranging from very hostile to very cooperative. For each instance of repression, both pre-repression and post-repression values are recorded. These values are then averaged over the 25-year period studied and the difference between the two means can then be used to determine trends in behavior. For the purposes of this study, cooperation is defined as an event that is considered positive in the context of the overall government-dissident relationship. Conversely, hostility is defined as an event that is considered negative in the context of that same relationship. This study is motivated by a desire to quantify and statistically analyze the levels of hostility and cooperation among dissidents in response to government repression. More simply, does government repression of dissident cooperation yield a substitution of tactics toward hostility? Does Government repression of dissident hostility yield a substitution of tactics toward cooperation? It is believed that dissidents will reduce their cooperation levels and increase their hostility following government repression of cooperation. Additionally, repression of hostility will cause dissidents to increase their cooperation levels and decrease their hostility levels. Statistical analysis of data from Indonesia from 1980 – 2005 corroborates both hypotheses.

Differentiation of Human Embryonic Stem Cells to a Vascular Phenotype

Elizabeth A. Godbey
Dr. Steven Stice, Department of Animal & Dairy Science, University of Georgia

Human embryonic stem cells (hESC) from early blastocysts are self-renewing cells capable of differentiating into every cell type present in the human body. They are a promising source of cells which may help develop treatments for human heart and vascular disorders. This project attempted to derive endothelial cells, the cells lining blood vessels, from hESC using four differentiation protocols. On day zero of the experiment, undifferentiated hESC colonies were transferred to laminin-coated tissue culture dishes. After 21 days of differentiation, the cells of each protocol were harvested and tested for expression of 47 genes by real-time PCR using a low-density array card. A portion of the harvested cells were replated on microscope slides for immunostaining with hESC and endothelial markers. The undifferentiated hESC, umbilical vein endothelial cells, microvascular endothelial cells, and hepatoma cells (all of human origin) were used as controls for both gene expression and immunostaining studies. Gene expression data was procured using SDS2.2.1 software and analyzed by the SAS package. Differentiated cells on slides were detected using fluorescent microscopy. Images were acquired with an Olympus Disk Spinning Unit. Both low-density array data and immunostaining images will be considered when evaluating the efficiency of the endothelial cell production from hESC by different protocols. Further refinement of protocols will be made to find the best method. The present project will potentially bring to light new ways of studying *in vitro* human angiogenesis, and thus would have a strong impact on future cardiovascular health strategies.

An Investigation of Botulinum Neurotoxin Interactions on RhoA Activity Using *In Vitro* Assays

Courtney Grant – CURO SUMMER RESEARCH FELLOW
Dr. Julie Coffield, Department of Physiology & Pharmacology, University of Georgia

Botulinum neurotoxin, the most poisonous substance known, primarily causes paralysis. It was observed that muscles treated with botulinum neurotoxin serotype A demonstrated the emergence of active nerve sprouts (neurites) from poisoned nerve endings. We believe that this finding may actually hold the key to the identity of the receptor for this toxin serotype. Dr. Coffield's team has preliminary evidence, obtained through affinity precipitation assays using homogenates of neuromuscular tissue, that neurotoxin serotype A binds a protein receptor known as NgR2 (Nogo Receptor 2) which is known to regulate axonal growth within the central nervous system via three ligands. One of these ligands, myelin associated glycoprotein (MAG), is also found in the peripheral nervous system, where its action is not as well understood, but in the CNS MAG's binding to NgR2 has been reported to activate RhoA, a small GTPase that ultimately regulates neurogenesis. In the current study, the action of botulinum serotype A on RhoA activity on tissue homogenates of the PNS were observed. Changes in RhoA activation from treatment with MAG and from the toxin were measured with the aid of absorbance- and/or luminescence-based ELISA kits designed to selectively detect activated RhoA. If competition assays using MAG and toxin confirm that any observed effect on RhoA activation is mediated by the selective binding of serotype A to NgR2, then NgR2 is a functionally significant receptor for botulinum neurotoxin. The ultimate goal of this study is developing therapeutic countermeasures that may be used in the event of toxin exposure.

Features of Nicaraguan Spanish

Katie Griffith – CURO SUMMER RESEARCH FELLOW
Dr. Diana Ranson, Department of Romance Languages, University of Georgia

This study investigates the use of noun, pronoun and null subjects in Nicaraguan Spanish through a quantitative analysis of a corpus of natural speech recorded in Jinotepe, Nicaragua in the summer of 2005. Knowledge of Nicaraguan Spanish is scarce, yet this dialect can provide a valuable point of comparison to studies of subject expression in other dialects of Spanish. For example, a widely debated issue is the functional compensation hypothesis, whether subject pronouns tend to be used when a final /s/ is dropped from a second person singular verb form, so that a speaker who says [a-bla] for *hablas* would be more likely to add a subject pronoun and say *tú hablas* [tu-a-bla]. This claim has been made for Puerto Rican Spanish, in which final /s/ is often deleted, yet it has been disproved by studies of Andalusian Spanish, an /s/-deleting dialect in Southern Spain and by studies of non-/s/-deleting dialects in Spain and Los Angeles. It is therefore interesting to determine the status of subject expression in Nicaraguan Spanish, which is an /s/-deleting Central American dialect which belongs neither to the Caribbean nor to the Southern Spain dialect area. In addition to determining the contribution of Nicaraguan data to the functional compensation hypothesis, this research analyzes additional hypotheses as well concerning the effect on subject expression of previous reference, contextual knowledge, and pragmatic functions, such as contrast, turn initiation, topic introduction, and the speaker's personal attitude. My research entails analyzing a self gathered corpus of native speech in order to show a correlation between a lack of subject nouns and pronouns and previous subject reference, implicit contextual knowledge, and the presence of these subjects to indicate contrast, turn initiation, topic introduction and the speaker's personal attitudes to the topic of discussion.

Systematic Empirical Study: The Impact of Sri Lanka's Economy on Dissident Behavior
Susan S. Guo – CURO APPRENTICE
Dr. Stephen Shellman, Department of International Affairs, University of Georgia

Dissident rebel behavior plays a large role in today's society. Dissident rebels' actions stem from various factors. My project focuses on the economic factor, which is debated in the literature. I am observing how the economic circumstance of Sri Lanka may affect domestic suicide terrorist acts. My project branches off of Project Civil Strife, which is headed by Dr. Stephen Shellman. Project Civil Strife furthers our battle against terrorism by conducting research to analyze the motives of domestic terrorist activities of rebel groups. Researchers working with this project are seeking to develop theories to explain and predict patterns of dissident group tactics and actions. It is essential for researchers to better explain terrorist actions so that we can develop effective techniques in combating terrorism. I chose the economy as the independent variable because it involves money, a large influence of many people's decisions. My project involves the collection of two aggregate data sets: suicide bombing events and economic statistics (monthly inflation, trade balance with the US). I will examine the evolution of Sri Lanka's economy from 1980 to 2006 and observe how the economy affects the frequency of suicide bombing attacks. I predict adverse economic conditions will increase suicide bombing while improving economic conditions will lessen it.

Intracellular Gene Transfer from the Mitochondrion to the Nucleus in *Toxoplasma gondii*
Erica M. Hall – CURO SUMMER RESEARCH FELLOW, CURO SCHOLAR
Dr. Jessica C. Kissinger, Department of Genetics, University of Georgia
(Erica M. Hall, Chih-Horng Kuo, Abhijeet A. Bakre)

Toxoplasma gondii is a unicellular, eukaryotic apicomplexan parasite that causes toxoplasmosis, a widespread disease capable of causing serious health problems in immuno-compromised individuals and pregnant women. *T. gondii* is a model protist parasite because of its genetic accessibility, ease of experimental use, and available genome sequences. *T. gondii* presents a unique opportunity to study the phenomenon of intracellular gene transfer between organellar and nuclear compartments. The *T. gondii* nuclear genome contains ~7,200 assorted fragments of its mitochondrial genome, accounting for up to 1%, depending upon the level of conservation, of the nuclear genome sequence. The focus of my research is to elucidate the mechanism(s) by which NUMTs (nuclear sequences of mitochondrial origin) arose in *T. gondii*. Our hypotheses include a mechanism of continual transfer of fragments over evolutionary time, or a few original transfers followed by subsequent fragmentation and multiplication within the nuclear genome. My computational research supports the former since NUMT sequence containing a 60-100% gradation of conservation with mitochondrial genome sequence are observed. Genomic southern blots confirmed the large number of NUMTs. My sequence analyses have discovered multiple 40-200bp repetitive elements encoded by the mitochondrial genome that may be facilitating transfer; however, this remains to be verified via analysis of the target insertion sites in the nuclear genome. The completion of this project will increase our understanding of genome evolution in this organism and the process of intracellular gene transfer.

Metal-Metal Bonds and Aluminum Clusters
Adele Handy – CURO SUMMER RESEARCH FELLOW
Dr. Gregory Robinson, Department of Chemistry, University of Georgia

Metal clusters on the atomic level provide insight into the behavior of the bulk metal. In an organometallic reaction, the ligand plays a very important role by stabilizing, protecting and influencing the resulting metal-metal bond. Upon formation of a metal-metal bond, the solution must be crystallized in order to further

study the composition of the air and moisture sensitive compound. During my summer research, I attempted to create two different crystallized compound with unique ligands attached, in order to characterize and analyze the resulting bonds. For one of the ligands, if crystallization occurred, an interesting aluminum cluster could have been the result. Two different ligands were investigated: triphenylmethyllithium and isobutylaluminumdichloride. After being synthesized, triphenylmethyllithium was reacted with the metal compound galliumtrichloride and then underwent a sodium reduction. After the reactions were performed, the conclusion was reached that the triphenylmethylgalliumtrichloride reduction failed. Although a dark reddish brown solution was obtained, crystals did not form, and the composition of the solution could not be analyzed. The second compound, a commercially made isobutylaluminumdichloride, was reduced during separate trials using potassium, sodium, and lithium. The attempted crystallization of the varying reductions of the isobutylaluminumdichloride was not successful either; no aluminum clusters formed. Through this research, I reached the conclusion that these two ligands are not good candidates for synthesizing compounds which can be crystallized for analysis.

The Face of Costa Rica

Comusina Celan Hardman – CURO SUMMER RESEARCH FELLOW
Prof. Joseph Norman, Department of Drawing & Painting, University of Georgia

In eight months, I became intertwined with the vibrant culture of Costa Rica; visitors cannot help but appreciate the subtle differences of the various regions in both the landscape and the people. Costa Rica is said to be the harmonious meeting of opposites: the meeting of flora, fauna, and bird life from both the northern and southern hemispheres, but also, a harmonious union of the ideas of different groups in Costa Rica. The population of Costa Rica is an interesting combination of old traditions and new ideas spiraling together to create a group who spends hours preparing gallo pinto for twenty unexpected extended family members, but also those who are fascinated with the microwave and the iPod. Like the United States, Costa Rica has become immune to the growing development and the booming tourism industry; they accept the necessity to learn English and the McDonald's located directly beside

historical monuments as part of their world. Through a series of journal entries, sketches, interviews and paintings, I wove together the unique personalities that represent Costa Rica, the faces who make a country whole. I captured the stories of those who are initially hidden from view in the tropical paradise. Their stories are told through pictures and words; the story of a man with a long white beard who traveled to parque central every day for thirty-five years to play games with children; the story of an unorthodox female artist who traveled the world just to return to Costa Rica to open a gallery of her own; the story of a family of Nicaraguan immigrants who took the yearly pilgrimage to Cartago to observe Costa Rican traditions. These are the people of Costa Rica who are found in a landscape trying to find a balance between development and preserving the natural beauty that brings over a million tourists a year. Each painting and sketch contains brilliant colors that reflect the animated nature of Costa Rica; the layers of circles and squares represent the many pieces that make up not only the image but also the country. My hope is to use the interest evoked by my paintings to bring awareness to the results of development in Costa Rica and keep a visual record of a previously more tranquil society. My work helps to capture and preserve pieces of Costa Rica that will continue to change and possibly disappear under the hands of outside influences within the next decade.

Creation of a Computer Game from Concept to Completion
Brian L. Harper
Dr. Mike Hussey, Department of Theatre & Film Studies, University of Georgia

The purpose of this thesis/project is to showcase my visual and audio works in one interactive multimedia application, or computer game. The concept of the game focuses on new ways for the user to interact with the computer. The standard mode of interaction with a computer involves pressing a button which translates abstractly to some action such as jumping or shooting. With the recent release of the Nintendo Wii, human-computer interaction is becoming more intuitive. For instance, swinging the Wii Remote during a tennis game will swing the racquet on screen. The goal of my project is to build on this one-to-one relationship between human action and computer reaction. Through the use of a glove and webcam, the user's hand movements are tracked and converted to digital data. A 3D model of a hand on the screen follows the movements of the user's hand by interpreting that data. The user must control the hand to defeat various enemies and obstacles before completing the level. The user is able to smash through obstacles by making a fist, shoot enemies by pointing fingers at them, and pick up items by grasping them between fingers. Through the process of creating the game, I became familiar with all aspects of producing an interactive computer game from start to finish. Additionally, I hope new modes of human-computer interaction can be applied to not only computer games, but all fields of study.

Site-mapping and Glycan Characterization of Functional Alpha-Dystroglycan
Sana Hashmi – CURO APPRENTICE & CURO SUMMER RESEARCH FELLOW
Dr. Lance Wells, Department of Biochemistry & Molecular Biology, University of Georgia
(Sana Hashmi, Stephanie Hammond, Jae-Min Lim, Kazuhiro Aoki, Mindy Perlman, Gerardo Gutierrez-Sanchez, James Wheeler, James M. Ervasti, Carl Bergmann, Michael Tiemeyer, Lance Wells)

Alpha-Dystroglycan (aDG) is a highly O-mannosylated glycoprotein that in a multiprotein complex serves as a bridge between the intracellular cytoskeleton and the extracellular matrix. In several forms of congenital muscular dystrophy, mutations exist not in aDG but in the glycosyltransferases necessary for the O-mannose addition and extension of the glycan structure necessary for proper aDG function. Hypoglycosylated aDG has also been associated with oncogenesis and metastasis. Given the importance of glycosylation of aDG in disease, the work presented here is our current progress in fully site mapping and characterizing the

glycans on aDG isolated, initially, from rabbit skeletal muscle. The sites of glycosylation are being mapped using mass spectrometry techniques for O-glycosylation including neutral-loss MSn directly on the glycopeptides and beta-elimination/Michael addition approaches. Released permethylated glycans are also being characterized by MSn approaches. The project's glycan analysis and site-mapping data to date include several O-Man and O-GalNAc initiated structures on multiple residues of aDG. Furthermore, a laminin-1 binding assay using surface plasmon resonance has been developed, which has been used to show binding of the aDG preparation. Currently using a host of glycosidases, the glycans necessary for aDG interaction with laminin-1 can be elucidated. Using all of this information, the project can determine the key functional sites of modification and glycan structures on aDG for laminin-1 binding. Following mapping and characterization of the glycans of aDG from rabbit muscle, aDG glycosylation will be studied in other tissues, tumors, and mouse models of congenital muscular dystrophy. This work is supported by the Muscular Dystrophy Association (LW) and the Jane and Bill Young Summer Fellowship (SH).

A Universal Language? Translation and Cultural Imperialism in the Writings of Karl Vossler and Alphonse Daudet

Elizabeth K. Hebbard
Dr. Martin Kagel, Department of Germanic & Slavic Languages, University of Georgia

Karl Vossler, an early 20th century German humanist and philologist, had a unique appraisal of the art of translation: he considered it cultural imperialism, where a literary work is forcefully annexed by the target language community and occupied by an army of its own readers. He claimed that this is partly due to the intense connection between cultural identity and language which is disrupted or dislocated in translation. My paper explores this connection and its function in translation by analyzing a short story of Vossler's contemporary, Alphonse Daudet. I will illustrate Vossler's position on the imperialistic nature of translation, using the story to parallel its subject matter: the colonization of a language community; and to provide examples for cultural considerations in translation. I will then address Vossler's idea of a "universal language," inquiring whether translation adds to the literary value and experience of the translated work by providing another concrete facet of its realization. I will demonstrate that Vossler and Daudet's conceptualization of the language-identity relationship is not only contradictory, but also exaggerated due to the bias of personal experience. Both men represent an era when language was essential to establishing cultural identity, and I will show that their claim that this identity is constructed exclusively through language is untenable; that the relationship between language and cultural identity is more multi-faceted than they make it out to be; and that translation is a means of adding to the pool of universal knowledge rather than a form of cultural imperialism.

RGS Proteins Regulate LPA Signaling in Ovarian Cancer Cells

Paul A. Henkel
Dr. Shelley Hooks, Department of Pharmaceutical & Biomedical Sciences, University of Georgia

Ovarian cancer is the most fatal form of gynecological cancer in the world. Characterized by the uncontrolled growth and proliferation of tissue in the ovary, ovarian cancer has a five-year 70% mortality rate following preliminary detection. Most patients who are afflicted by ovarian cancer are symptomatic only in advanced stages, showing abdominal swelling caused by a build up of Ascitic Fluid. It has been found that Ascitic Fluid contains increased levels of Lysophosphatidic Acid (LPA). LPA is an intercellular lipid mediator that promotes increased stimulation of cell proliferation, cell survival, and tumor cell invasion in ovarian cancer cells. LPA has been shown to interact with specific receptors coupled to G-proteins embedded in the cellular membrane (specifically LPA1, LPA2, and LPA3). Regulators of G-

protein Signaling (RGS proteins) are inhibitors of G-protein activation that act by binding to G-proteins and stimulating GTPase activity, effectively terminating G-protein activity. The goal of this project is to gain insight into the possible effect of RGS proteins in LPA induced cellular signaling, specifically the production of cyclic adenosine monophosphate (cAMP) which is a constituent in the cellular signaling pathway that regulates proliferation. Our strategy involves the use of the cAMP assay to measure LPA effects on Gi-coupled cell signaling in the SKOV3 strain of ovarian cancer cells. Since the beginning of the project, we have successfully produced mutant cells that are resistant to regulation by RGS proteins. Preliminary data suggest that RGS proteins are involved in the physiology of ovarian cancer in the SKOV3 cell line. Our future work will include the quantification of the RGS involvement in the signaling pathways of the SKOV3 strain as well as other variations of ovarian cancer cells.

NERUDA

Carol M. Herbert
Prof. Susan Roberts, Department of Graphic Design, University of Georgia

Pablo Neruda was a Nobel Prize winner, a poet, and a champion of the "everyman". He wrote poetry for the masses so that everyone could enjoy the beauty of words. Pablo Neruda used words to unite "the community of man." This menu was designed for a restaurant modeled after the ideals of Pablo Neruda, hence the name NERUDA. The concept of the restaurant was a place where intellectuals and creatives could mingle and mix, enjoying food and drink from all over the globe. In the spirit of Pablo Neruda, this restaurant would donate a certain percentage of its proceeds to literacy foundations around the world, in the hopes of spreading the gift of words. The visual concept for this menu came simply from the pages of a book. I used photographs I took for the background visual. I

wanted the letters of the identity to reference these pages. I used the repetition of lines to bring the typography out, as well as the geometry of the letters to add color in an unexpected way. This line motif is repeated on the interior spreads, as well as the geometric shapes created by the letter forms. My hope in doing this was to have a literary feel in the design. To me design is about incorporating conceptual and visual elements—the symbols and the form—to create a balanced harmony with purpose. It's about seeing what is not there and creating anew. When I approach a design problem, I am always keeping these principles in mind. I look at the elements that need to be involved and try to create a scenario of harmony through balance. I try to look at the thing with an abstract eye and see if the composition and color are pleasing. I think of the main point I am trying to make, and then try to show it in an intelligent way. I focus on the negative space—the underlying ideas we do not actually see but which in fact communicate the message—and try to bring them to light.

Hand to Mind Coordination.
Cassie L. Hester
Prof. Susan Roberts and Prof. Alex Murawski, Department of Graphic Design, University of Georgia

Doodle, as defined by *Webster's Dictionary*, is "a rough drawing made absentmindedly." Doodling is a brain-storming methodology. The notion of churning out solutions whilst scribbling may seem like wishful thinking, but I find that it relaxes me and allows my brain creative freedom. Compositions, imagery and patterns are often the result of my "absentminded" endeavors. Other times, words and concepts are evoked through this meditative practice.

Shoe illustrations
Ink and watercolor
8 in. x 12 in.
2007

Birdsong in the Minnesang Tradition: Natural Imitation and Symbolic Association
Sojourner Hodges
Dr. David Schiller, Department of Musicology & Ethnomusicology, University of Georgia

Since the times of the ancient Greeks and Romans, the natural world and its inhabitants have been the source of endless fascination within the arts; as early as 414 B.C.E., Aristophanes utilized live bird vocalizations in his comedy *The Birds*. Perhaps because birds are the original songsters, birdsong has long held sway over composers. One of the most remarkable periods of interest in birdsong was during the Minnesang (a tradition of lyric song in Germany that flourished from the 12th century through the 14th century). Two composers of the Minnesang era, Walther von der Vogelweide and Oswald von Wolkenstein, used birdsong in dramatically different ways. In analyzing Oswald von Wolkenstein's song "Der Mai mit lieber zal" and Walther von der Vogelweide's song "Unter der Linden," I will attempt to isolate and discuss the various birds therein, their respective roles, their literal and symbolic representations, and their diverse impacts on the two composers. Furthermore, I will examine both composers' use of not only their own imaginations in assigning roles to specific birds, but also of their use of traditional folkloric portrayals of the characteristics of various birds. These two composers and their use of birds and birdsong provide a unique glimpse into the naturalistic atmosphere of music in the Minnesang era.

The Integration of Aesthetic Principles and Human Movement
Mia Holtzman
Professor Bala Sarasvati, Department of Dance, University of Georgia

My current project involves the exploration of common choreographic vocabulary while integrating the ideals of basic human movement to create a dance form of both novelty and predictability. Movement based merely on traditional technique has the potential of becoming monotonous. Therefore, my composition expands on the works and teachings of conventional choreographers by fusing ballet and modern with distinctively different human expressions and actions. I believe the non-literal story I express through my movement may portray feelings and experiences shared by many. My objective was not to dance in a way that the obvious becomes evident, but rather to perform with the passion instilled from the lyrics. The result of assimilating communal human emotion and gesture with time-honored technique is a dynamic and thought provoking display of what new age dance can accomplish.

It's lonely out here
Matt Howell
Prof. Alex Murawski and Prof. Susan Roberts, Department of Graphic Design, University of Georgia

In art, as well as life, we should all strive for clarity whether it is clarity of image on the canvas or clarity of mind when facing adversity. In artistic endeavors the final piece is what one sees as the artist's lucid vision, but it is not. It is a crystal representation of the viewer's perception. As soon as the artist completes a work for display it no longer belongs to them; it is a limpid mirror that we all own and use to look into ourselves.

Conte and colored pencil on black illustration board
12 in. x 24 in.
2005

Epistatic Interactions among Long-lived *Drosophila melanogaster* Mutants

Annie Huang
Dr. Daniel Promislow, Department of Genetics, University of Georgia

Several different theories exist to explain the causes of aging. One of these theories, the mitochondrial theory of aging, states that all cells naturally produce and build up harmful free radicals such as reactive oxygen species. In recent years, scientific research has discovered numerous life-extending mutations in *Drosophila melanogaster* populations, many of which exhibit a strong resistance to various stresses such as oxidative stress. The purpose of this experiment is to discover whether combinations of unique long-lived mutations affect life span and also oxidative stress resistance. We will study three distinct life-extending mutations, where each acts in a unique pathway: Indy, EcR, and Enigma. Different pathways are key because if two mutations act in the same pathway, then the resulting reaction towards a particular stress is likely to be similar to the reaction of the control population containing a single mutation. We hypothesize that the combined mutant lines will display the strongest tolerance toward oxidative stress and the greatest lifespan extension. Along with the combined mutant lines, we will create three different control lines. First, each control background will be crossed with each different control background; second, each mutant line will be crossed with its own control background; and third, each mutant line will be crossed with different genetic backgrounds. At this point, our data are still being analyzed. We chose to perform an oxidative stress assay due to the fact that all living organisms produce harmful free radicals and also to reach the ultimate goal of understanding the aging process better. With a greater understanding of genetic processes, a greater understanding of human health follows. Currently, we know much about these genes' pathways of action. Furthermore, epistatic interactions between mutations that act in the same pathway have also been elucidated; however, interactions between mutations that act in different pathways have yet to be thoroughly studied.

Magnitude of the Inverse Relationship between Nighttime Transpiration and Hydraulic Redistribution in *Quercus laevis*

Margaret A. Hubbard
Dr. Lisa A. Donovan, Department of Plant Biology, University of Georgia

C3 plants use stomatal regulation to prevent unnecessary water loss, and recent studies have shown significant nighttime stomatal conductance and water loss in C3 plants. Another process, hydraulic redistribution involves water flowing from the wettest soil layers through the plant to drier regions in the soil. Because nighttime transpiration contributes to water loss in a plant, we hypothesized that by minimizing water loss through this process, hydraulic redistribution can be maximized. This hypothesis was tested in a greenhouse study using *Quercus laevis*. Plants were grown with their root systems split between two adjacent pots. The magnitude of water hydraulically redistributed between the pots was quantified using screen cage psychrometers, which measure availability of water for plant uptake. Treatment involved bagging plant canopies on alternating nights to suppress nighttime transpiration. The results were found to be insignificant. However, a previous parallel study with *Artemesia tridentata* found significant evidence to support the same hypothesis. Because water is required for photosynthesis and the absorption of essential nutrients from the soil, a further understanding of the process of hydraulic redistribution could offer insight into how plants interact with their environments to obtain these essential materials. Also by studying different species, we can gain a better understanding of how hydraulic redistribution differs between species from similarly dry habitats.

Taking *Clostridium thermocellum* ORFans from the ORFanage and Crystallizing Them in Search of Possible Novel Folds

Justin L. Hula – CURO SCHOLAR
Dr. Claiborne Glover, Department of Biochemistry & Molecular Biology, University of Georgia

As the number of sequenced genomes increases, the number of ORFs, open-reading frames that could potentially encode a protein continues to grow. Among this collection of ORFs lies a group of singleton ORFs, cleverly deemed singleton ORFans, which have not been found in other genomes. New sequence discoveries continue to further subdivide these ORFs: non-ORFans are found to be homologous in other families, orthologous ORFans are found only in the organism's family, and paralogous ORFans are found only in the organism's species. These unique singleton ORFans may then hold an insight into why organisms are different from each other. The goal of this work is to express, purify and crystallize a protein containing novel fold from selected singleton ORFan targets. Three singleton ORFans have been cloned in Top10 *E. coli* cells, expressed in BL21 (DE3) RPX cells, and purified with Nickel columns and Gel filtration. Work is underway to crystallize the transcribed protein from these singleton ORFans, and we hope to possibly identify a novel fold from the crystal structure. Dr. B. C. Wang's lab has achieved a forty percent success rate of identifying novel folds of the proteins in these singleton ORFans via crystallography. A crystal structure of these proteins will allow research into how they interact with other proteins in vivo. In general, knowledge of novel folds will allow a fuller understanding of these interactions and may ultimately uncover cures for diseases such as HIV/ AIDS, ataxias, Alzheimer's, and cancer.

Living in Fire, Ice, and Cardboard*; *Hotter'N Hell*; *Green with a Cowboy Print*; and *Thanksgiving with the Pope, Popeye, and the Mafia

Brittney Inman
Prof. Judith Ortiz Cofer, Department of English, University of Georgia

Last semester, Fall 2006, I was privileged to participate in Dr. Judith Ortiz Cofer's intensive creative writing course, which sanded my writing into a raw, original shape. Under her expert guidance, I wrote a variety of creative non-fiction pieces that I am proud to present at the CURO 2007 Symposium. As I wrote each piece, I selected true experiences and true people from my life and entwined and expressed them in an artistic way to capture particular themes, characters, and moments. Thus, writing these works was reminiscent of putting the pieces of a puzzle together; I endeavored to connect various pieces of my life to create meaningful designs. Among these creative non-fiction works is the prose poem, "Living in Fire, Ice, and Cardboard," which is a lyrical montage of experiences, reflecting upon a family's repetitive yet progressive series of moves from state to state, told from a child's perspective. The other works presented are short, creative non-fiction prose pieces, which include: "Hotter'N Hell," a series of three scenes, each told from a different time in a girl's life, exposing her father's extreme disposition and downfall; "Green with a Cowboy Print," a depiction of a mother-daughter relationship from a teenage girl's perspective; and "Thanksgiving with the Pope, Popeye, and the Mafia," a characterization of a grandfather's rich personality through a Thanksgiving setting. My hope is that these glimpses of meaning, crafted from life's clutter will evoke a feeling or change within the reader, whether it is subtle, nameless, or ephemeral.

The Who, What, Where and Why of Georgia's 2006 Agriculture Commissioners Race: An In-depth Look at the Reasons for Tommy Irvin's Landslide Victory over Gary Black

Jennifer S. Ivey
Dr. Charles Bullock, Department of Political Science, University of Georgia

Georgia's political landscape has changed. Beginning many years ago with Republican Senator Mack Mattingly's defeat of Democratic Senator Herman Talmadge and culminating in the election of a Republican General Assembly, as well as a two-term Republican Governor, elections at most levels in Georgia have become competitive for both parties. Because of this, connected Republicans across the state assured the media that this was the year a Republican was finally going to take the office of the Agriculture Commissioner. However, election night came and delivered the Republican challenger, Gary Black, exactly 321,476 fewer votes than Tommy Irvin. The purpose of this study is to understand why Irvin was so successful in his defeat of Gary Black. Irvin's past victories will be analyzed, county by county, and compared to the counties in which Black was victorious. In addition, a comparison of the candidates' media shares will be made. A least squares regression model will be used to control for the relative Republicanism in Georgia, differences in North and South Georgia, as well as the Urban, Suburban, and Rural area differences. The results from this study can help political scientists understand what areas of Georgia have become more Republican, and those areas which are remaining staunchly Democratic. Furthermore, while other state-wide races in Georgia have been analyzed by political scientists, the Agriculture Commissioner's race is a topic that has received no attention among researchers.

Genetic and Environmental Effects on Aggressive Behavior in *Drosophila*

Jae W. Jeon, Daniel Alvarez, Jarrad Barber
Dr. Wyatt Anderson and Dr. Yong-Kyu Kim, Department of Genetics, University of Georgia

Aggression is a familiar behavior expressed by different animals, including humans. The causes of aggression are, however, not well known. We investigated the environmental and genetic effects on the formation of *Drosophila melanogaster* aggressive behavior. To test the prediction that male fly aggression is influenced by the environment and genetic make-up, we utilized two types of flies, wild type and mutant type. We also raised them in two ways, in social isolation and in group, to determine how these two factors interact on the aggression in *Drosophila*. We observed six aggressive behaviors - fencing, lunging, boxing, wing threat, holding, and chasing. The aggressive index was measured using a total amount of these behaviors and statistically analyzed using the ANOVA. Our data showed that wild types were more aggressive than mutant flies; and isolated males tend to be more aggressive than communally raised ones. We also found a sexual dimorphism in aggression: males are more aggressive than females in wild types but not in mutant types. These results confirmed that both genetic and environmental factors played important roles in the formation of aggressive behavior in *Drosophila*. This study will be useful for better understanding of human aggressive behavior. Several studies report that genes such as MAOA are involved in aggression, and maltreatment significantly increased aggression in the childhood and adolescent stages. We intend to look at the association between aggressive behavior and brain development in *Drosophila*.

Screening of Fosmid Library of Environmental Genomic DNA from Sapelo Island

Heather E. Johnson
Dr. James Hollibaugh, Department of Marine Sciences, University of Georgia

The purpose of this project was to explore the metagenome of the microbial community at Dean Creek, Sapelo Island, Georgia. A metagenomic library was constructed by splicing randomly selected pieces of DNA extracted from the microbial assemblage and inserting them into a plasmid hosted in *E. coli*. The library was screened, targeting 16S rRNA, bacterial and archaeal ammonia monooxygenase (amoA), proteorhodopsin, arsenate reductase, Rubisco, and ATP citrate-lyase genes. Successful amplifications indicating the presence of the gene of interest were identified using agarose gel electrophoresis or denaturing gradient gel electrophoresis. Draft sequences were obtained from PCR products and compared to published sequences. The presence of the 16S rRNA genes in fosmids allowed us to identify four clones that were derived from Actinobacteria, three from gamma Proteobacteria, and one from alpha Proteobacteria. One clone out of the 5,280 screened appeared to contain an arsenate reductase gene and one contained a Rubisco gene. None of the other targeted genes that were screened for were found in the fosmid library. Fosmids containing genes of interest were sent to the Broad Institute for complete sequencing. The full sequences from the fosmids may reveal novel genes from this community. They will also allow us to associate single genes with taxonomic markers providing an understanding of functional diversity.

DNA Recognition by a Novel Recombinase

Joseph P. Johnson, CURO SCHOLAR
Dr. Anna Karls, Department of Microbiology, University of Georgia

IS492 is an insertion sequence found in the marine bacterium *Pseudoalteromonas atlantica*. IS492 is inserted into the *P. atlantica* chromosome in at least five locations. Insertion and excision of IS492 from one of the locations, a putative glucosyl transferase gene, controls the production of extracellular polysaccharide (EPS). EPS is important for the biofilm formation ability of *P. atlantica*. The transposase, MooV, catalyzes the movement of IS492. In order to catalyze the excision of IS492 and its subsequent insertion, MooV must first bind site-specifically to the ends of the IS element before introducing nicks into the DNA. The goal of this project is to characterize MooV DNA binding activity using in vivo assays. Our current approach is to measure in vivo MooV binding to the junction of the ends of IS492 that is formed when IS492 excises from host DNA to give a circular intermediate; this junction sequence was previously shown to be a very strong promoter. Using a plasmid construct with the junction sequence inserted upstream of a promoterless lacZ gene, MooV binding to the element ends is detected as repression of lacZ expression (measured by beta-galactosidase assays). Interestingly, results at this juncture suggest that cleavage-defective MooV variants bind and repress the junction promoter more effectively than wild-type MooV. Further experiments are in progress to determine whether the level of MooV expression or catalytic activity of the recombinase affects the occupancy of the promoter sequence within the circle junction.

A Biotechnological Approach to Restoration of American Chestnut (*Castanea dentata*): Mass Propagation via Somatic Embryogenesis

Sara B. Johnson
Dr. Scott Merkle, Department of Forestry Research, University of Georgia

The American chestnut was one of the most important forest trees in the Appalachian Forest until the introduction of the chestnut blight fungus, which caused the death of virtually every mature American chestnut tree in the eastern United States. A system for mass propagation of blight-resistant material obtained through conventional breeding or gene transfer is still lacking. Thus, the goal of our project is to

develop a high-frequency *in vitro* propagation system for American chestnut via somatic embryogenesis, a process by which thousands of structures ("somatic embryos") resembling the embryos in seeds can be produced and germinated to form seedling-like plantlets. Two bottlenecks in this approach are the low initiation rate (<1%) of embryogenic cultures and the production of plantlets from the somatic embryos. To increase embryogenic culture initiation, we tested two plant growth regulators (2,4-D and picloram) at different concentrations and found that 2,4-D resulted in the highest frequency of embryogenesis (up to 3.5 %). To increase plantlet production, we tested variations in cold (4° C) treatment duration (12, 15, and 18 weeks) and light quality (red, red + far red, and cool white fluorescent). For some genotypes, the longer cold treatments improved plantlet production and red light improved overall plantlet production frequency (up to 80% and 69%, respectively). Thus, by manipulating the cultural treatments, we were able to increase culture initiation frequency and plantlet production efficiency. These production methods will aid in the restoration of the American chestnut in our forests.

Early Childhood Education and Family Literacy in Athens

Jimari L. Jones, Jeremy Atkins – ROOSEVELT @ UGA
Dr Elizabeth DeBray-Pelot, Department of Lifelong Education, Administration & Policy, University of Georgia

Athens, Georgia, has one of the nation's highest poverty rates. At roughly 28%, Athens has a poverty rate twice that of the state. Poverty is a humiliating phenomenon that binds and constrains families, creating communities of devastation and concentrations of despair. As a result, impoverished families are hindered from fulfilling the promises and dreams that have come to epitomize America. Therefore, we have developed a comprehensive bi-generational policy designed to combat the ill effects of poverty. Our policy initiative provides for an Athens-Clarke County-wide universal preschool program to positively impact the early childhood development among children of low-income families in the community. To complement this early-childhood initiative, an adult program would be established, empowering parents to sustain employment and create and maintain healthy learning environments at home in practical ways. It addresses the basic educational needs of low-income parents and children up to age eight by providing a unified program of: (1) adult basic or secondary education and literacy programs for parents, (2) assistance for parents to effectively promote their children's educational development, and (3) early childhood education for children. Our hope is to inspire and motivate children before even beginning elementary school. Secondly, by providing adult and family literacy, this ensures the children have the positive reinforcement necessary from parents that spurs interest and a healthy passion for an education.

Intersections

Kerry Jones
Prof. Andrea Trombetta, Department of Fabric Design, University of Georgia

These three garments serve as these three women's uniforms. They are extensions of themselves, they are explanations of themselves. Each garment was created specifically for each hand-picked woman, and fitted to her body. Exaggerated hips on the pant, the short and the skirt emphasize the importance contemporary America places on both body image and fertility. This piece relies on the investigation of discomfort within society due in part to

changing, as well as ever-present, gender roles and the impossibility of avoiding judgment throughout our lives. Photographs of steel parts in repetitive positions are the subject of the imagery, though abstracted. Grey cotton was screen-printed with these images using various shades of grey pigment. This dulled palette provides a somewhat blank, though still visually stimulating, canvas for the added details to express the personality of each individual piece and of each individual wearer. The women used as models resemble each other greatly, adding to the feeling of a blank canvas waiting to be dug into. Every garment has accents of red, orange or yellow; the colors of fire. These accents represent the inner audacity stifled by society's desire for the grey exterior; the audacity bubbling right beneath the surface of the women adorned with the pieces. The women are literally bound in a space by VHS tape, creating a visual representation of their tension due to inequality, expectations, abnormality, psychoses, whatever each woman feels, whatever any human being feels.

Sampling Ambient Air to Test for Polycyclic Aromatic Hydrocarbons

Kunal N. Kanani
Dr. Geoff Smith, Department of Chemistry, University of Georgia

The air in Athens, GA was sampled and tested for the presence and the amount of Polycyclic Aromatic Hydrocarbons (PAHs) over a period of one year. Polycyclic Aromatic Hydrocarbons (PAHs) occur widely in the environment as a result of incomplete combustion of fossil fuels and other inorganic matter. The major source of PAHs in the atmosphere are burning of wood, coal, automobiles and heat and power plants. The Environmental Protection Agency (EPA) has classified 16 PAHs as potent human carcinogens. Some of them include anthracene, benz[a]anthracene, benzo[ghi]perylene, benzo[a]pyrene, pyrene, benzo[k]fluoranthene, chrysene, and fluorine. These PAHs induce genotoxic and chronic effects in humans. It was predicted to detect the 16 EPA classified PAHs by using similar methods that have been used in the past by other researchers. Ambient air was sampled using a glass fiber filter paper attached to a pump. Then, the sample was extracted and a suitable technique for extraction was determined. Ultrasonic bath using methylenechloride as solvent was found to be an efficient technique for extraction. The different analytical methods used to detect PAHs were HPLC (high-performance liquid chromatography), GC (gas chromatography) and quadrupole mass spectrometry. The results obtained from the HPLC/GC were inconclusive because PAHs were found to be below detection limit of the HPLC/GC but a suitable result was obtained from the mass spectrometer with identification of some PAHs like fluoranthene, pyrene and other particles in the atmosphere like alpha pinene ozonolysis products. Furthermore, this paper reports the problems encountered, such as obtaining efficient extraction of the PAHs from the filter paper, lowering the detection limits of the analytical methods and measuring PAH concentrations quantitatively.

The Role of Extremism in the Arab-Israeli Conflict

Samantha E. Keyes-Blumer
Dr. Christopher Allen, Department of International Affairs, University of Georgia

Recent literature aside, diverse peoples have actually flourished together in the Middle East for hundreds of years. Under the benign neglect of the Ottomans, various cultures coexisted and even assimilated into a relatively cohesive Middle Eastern culture. Why then, have the peoples of the Middle East been caught up in an increasingly violent and intractable conflict? One explanation offered by scholars is the growth of extremism. Popular commentators, policy wonks, and serious scholars alike label everything from Iraq's civil war to peaceful student protests as "extremism" and "fundamentalism." A plethora of terminology with vastly different meanings has been co-opted in an attempt to understand the complex civil and communal conflicts of the Middle East. This presentation will attempt to unpack and differentiate among these terms. It will offer

precise definitions and focus specifically upon action as extremism: the committing of a violent, unprovoked act, as opposed to simply the threat of violence. Next, the presentation will examine various actions and events, which meet the definition of extremism, to see if they share characteristics that explain the pattern of punctuated, violent episodes that have occurred throughout the last century. For example, a pattern of violent Arab revolts might share the characteristic of being preceded by illegal land confiscations. Extremism in Israeli, Palestinian, and/or the Arab governments and citizenry will be explored: Is extremism entrenched in the actions of the Israelis, the Arabs, both, or none at all? Finally, policy proposals for possible solutions to the Arab-Israeli conflict will be suggested.

Diagnostic Assay for *Mycoplasma bovis* Using Immunohistochemistry

John R. Killey
Dr. Corrie Brown, Department of Veterinary Pathology, University of Georgia

Mycoplasma bovis is an important cause of pneumonia in cattle. Treatment of diseases resulting from *M. bovis* usually proves very difficult because *Mycoplasma* species lack cell walls, which separates them from most bacteria, and thus renders them invulnerable to many of the main categories of antibiotics. The first step in a successful treatment for *M. bovis* begins with an accurate and reliable diagnosis. The purpose of this experiment is to develop a diagnostic assay for *M. bovis* using immunohistochemistry (IHC). Using a monoclonal antibody specific for *M. bovis*, followed by application of avidin-biotin complexes (ABC) and enzyme substrates, the bacteria were effectively localized within lung tissue harvested from cattle suspected of having the disease. By honing the sensitivity and specificity of the IHC method used, the University of Georgia College of Veterinary Medicine's diagnostic laboratory hopefully will be able to improve its reliability and accuracy in making diagnoses on clinical specimens submitted for analysis. As a result, treating diseases which result from infection with *M. bovis*, such as pneumonia, will become easier and more effective.

The Influence of Muscle Length on Muscle Oxygen Saturation

Aaron K. McPherson
Dr. Kevin McCully, Department of Kinesiology, University of Georgia
(J. Michelle King, Aaron K. McPherson, Christopher P. Elder, Christopher D. Black, Kevin K. McCully)

Previous studies have suggested that chronic stretching might be able to produce an increase in the size of skeletal muscle. However, stretching might also result in restricted blood flow which might influence any stretch-training program. This study evaluated the influence of muscle position (shortened, neutral, and stretched) on muscle oxygen saturation using near infrared spectroscopy (NIRS). An 8 channel NIRS probe was placed on the calf muscles of 5 healthy adults. Measurements were made over 30 minutes in the three positions with the subjects performing 5 second maximal contractions once every minute. Oxygen saturation values were normalized with the maximum and minimum levels of oxygen saturation recorded. Oxygen saturation before (rest) and during the different conditions were measured and confirms that the stretched position significantly lowered oxygen saturation relative to the other conditions. Stretching either passively or with contractions decreased oxygen saturation, such that stretch training may also have a significant hypoxic component. A stretch-training program will have other components that will influence the development of muscle because other studies have shown that a decrease of oxygen within the muscle can also enhance muscle growth.

Tracking Continent-wide Parasite Spread in Monarch Butterflies: Launching a New Citizen Science Project, MonarchHealth

Natalie D. Kolleda
Dr. Sonia Altizer, Institute of Ecology, University of Georgia

Monarch butterflies (*Danaus plexippus*) are iconic insects that occur worldwide and are best known for undertaking a spectacular annual migration in parts of N. America. The protozoan parasite, *Ophryocystis elektroscirrha* (*OE*), infects all monarch populations examined to date and prevalence varies inversely with host migratory distances, with highest prevalence in populations that breed year round and do not migrate. To better understand how migration influences variation in parasite prevalence over space and time, in spring 2006 we launched a new citizen science monitoring project, MonarchHealth. We predicted that volunteer-collected samples across North America would show increasing prevalence of *OE* throughout the breeding season following transmission from adults to larvae. We further predicted that prevalence would be lowest among monarchs sampled at the extreme northern limits of their breeding range. After publicizing this project through environmental outreach programs, we recruited nearly 100 volunteers from across the U.S. and Canada. We developed a kit for volunteers to obtain samples from wild-caught monarchs; samples were returned to our laboratory at UGA and examined a microscope to check for the presence of *OE* spores. Results showed that about 12% of monarch butterflies were infected with *OE* during the 2006 breeding season, and that parasite prevalence increased toward the end of the breeding season, as we had originally predicted. This project enabled us to involve the public in collecting scientifically useful data at a continent-wide scale, with broader implications for understanding how monarch migratory behavior – currently classified as a "threatened phenomenon"– influences parasite infection patterns.

Synthesis and Photochemistry of 8-Cyano-7-hydroxyquinoline (CHQ): A Photolabile Protecting Group with a High Photochemical Quantum Efficiency for Biological Use

Christopher H. Kragor
Dr. Timothy Dore, Department of Chemistry, University of Georgia

8-Bromo-7-hydroxyquinoline (BHQ) is a photolabile protecting group for carboxylic acids, phosphates, diols, and phenols, which are commonly encountered functional groups in bioactive molecules such as neurotransmitters, DNA, RNA, messengers, and drugs. BHQ is stable in the dark under physiological conditions, and upon one- (1PE) or two-photon excitation (2PE); it releases the bioactive molecule in its active form. 2PE enables the tight 3-dimensional spatial release of the protected group. The light-triggered release of bioactive molecules is important because it enables many applications in research and medicine, such as the controlled inhibition of protein synthesis or the delivery and activation of drugs. Additionally, it will help further our understanding of the action of neurotransmitters and other biological messengers. An 8-cyano derivative of BHQ was successfully synthesized, 8-cyano-7-hydroxyquinoline (CHQ). The synthesis involved addition of dichlorocarbene to the C-8 position of quinaldine to generate an aldehyde, which was converted to an oxime. Dehydration provided the nitrile. The cyano group, which does not promote intersystem crossing (ISC) to the triplet excited state, like bromine does, improved the light sensitivity of CHQ. ISC competes with photochemical processes, lowering the quantum efficiency of carboxylate release. CHQ shows increased absorptivity when compared to BHQ, but the quantum efficiency is similar because of increased levels of fluorescence, which competes with the photochemistry. CHQ demonstrated a lower 2PE cross-section than BHQ, which might be explained by the increase in fluorescence.

Healthcare Coverage among Latinos in an Emerging-Gateway Southern State

Joseph T. Lariscy – CURO SCHOLAR
Dr. Leigh Willis, Department of Sociology, University of Georgia

This study examines the disparity in healthcare coverage between Georgia's new Latino population and the state's non-Latino, white residents. Between 1990 and 2000, the Latino population in Georgia tripled (Census Bureau 1990 and 2000). This influx to Georgia, and several other southern states, was a result of a growing demand for low-wage, unskilled workers in local economies. Georgia's healthcare system had to respond to the rapid arrival of a population that possessed a language and culture different from that of the mainstream native-born residents and lacked familiarity with Georgia's healthcare policies. This lack of knowledge of the medical practices of the dominant culture may impair the ability of Latino immigrants to obtain health insurance for themselves and their families. Analyses are based on the 2005 Behavioral Risk Factor Surveillance System (BRFSS), collected by the Centers for Disease Control and Prevention. Logistic regression was performed to show the effect of various demographic factors, including race/ethnicity, age, education, and income, on likelihood of possessing health insurance. The results show that, in Georgia, non-Latino whites are more likely to have health insurance than are members of the state's increasing Latino population. This conclusion suggests that in emerging-gateway southern states, Latinos may be assimilating into the underclass, where adequate healthcare is difficult to obtain. The research is important because it may assist Georgia's healthcare professionals as they work to solve the state's healthcare disparities.

Functional Analysis of the *Magnaporthe grisea* Secretome

Brian T. Laughlin
Dr. Alan Darvill, Departments of Biochemistry & Molecular Biology, Plant Pathology, University of Georgia

Magnaporthe grisea is the causal fungal agent of rice blast disease responsible for the annual loss of 200 million tons of rice output worldwide. Under various growth conditions, *M. grisea* secretes a large number of extracellular proteins (ECPs) presumably required for growth, development, pathogenicity, maceration of host cell walls, and molecular signaling. Many ECPs have been identified, but their exact biological functions remain to be determined. Among these extracellular proteins, two *M. grisea* ECPs, MgEcp22 and MgEcp23, are exclusively secreted during infection of the plant host, thus may be pathogenicity factors or signal-molecules involved in the regulation of interactions between the fungal pathogen and plant host. To better understand the roles of MgEcp22 and MgEcp23, *M. grisea* expression systems capable of over-expressing the ECPs are being developed. Initially the traditional, though laborious, restriction-ligation technique was used to clone *MgEcp22* and *MgEcp23* into an expression vector. In an effort to reduce labor, I also tested, though not yet successfully, a high-throughput technique to clone the ECP genes using the yeast gap-repairing protocol, which takes advantage of the high rate of homologous recombination in yeast. One finished expression construct, pWH102, which carries the *MgEcp22* gene, has been transformed into *M. grisea*, and the over-expression of the MgEcp22 is being examined using antibodies against epitope tags fused to the ECP. The probable formation of protein complexes between MgEcp22 and a host protein or proteins during infection will also be investigated. Such complexes, if purified, may then be characterized using current proteomics technology.

Soldier Series Fall 2006
Chandler Leathers
Prof. Michael Marshall and Prof. Stephen Scheer, Department of Photography, University of Georgia

The images are photographed using a 4x5 toyo field camera. I have been photographing UGA's Army ROTC members since the Spring of 2006 in an effort to put a face on our armed services. I feel that too often with media coverage that we forget that the UNITS and branches often casually discussed contain individuals who have chosen to put their lives on the line for causes sometimes that are not seen as black and white. Also, these individuals are not just in a day-to-day job; it is a lifestyle that requires a 24-hour commitment, whether to training or to picking up roots at the drop of a hat. I realize that it is a personal choice and there are a lot of benefits, but there are only a select few who have the discipline and will power to do the things they do.

The English-only Movement: A Critical Analysis through Comparative Study of French Language Regulation
Brian Levy – CURO SUMMER RESEARCH FELLOW, CURO SCHOLAR
Dr. Larry Nackerud, School of Social Work, University of Georgia

Within the increasingly polarized American political debate on immigration, the English-only movement continues to gain prominence. Recently, the US Senate passed two language bills, declaring English the common, official, and unifying language of America. These regulatory acts come as the Hispanic population within the United States continues to burgeon—approximated at 14.1 percent in 2004. Governmental regulation of language is not a phenomenon unique to America. France, Spain, and other worldwide nations have also undergone varying degrees of language management. The first part of this paper is an ethnographic case study that utilizes France as a model for potential American language regulation. France offers the most promising source of exploration due to its long regulatory tradition, as well as strong national culture. To effectively examine the nature and consequences of French lexicon management, a phenomenological-explanation model—with semi-structured interviews of linguists, media workers, and a French Culture Ministry Official being the primary method of data gathering—was used. The rationale, structure, and effects of French regulations are highlighted. The second half of the study is a policy analysis that employs this data to argue against the feasibility of language regulation in the United States. National and multinational cultural implications are also underscored.

A Field Guide to English/Spanish Medical Translation
Robert B. Lindell
Dr. David S. Williams, Honors Program, University of Georgia

Given the steady increase in the Hispanic population in the US, the need for Spanish-

speaking medical professionals is growing. In light of the current lack of bilingual physicians, our healthcare system relies on medical translators to bridge the language gap that hinders patient care. However, due to sheer patient volume and the economic burden of highly-skilled, full-time translators, hospitals are struggling to effectively treat Hispanic patients. In response to this current limitation of our medical system, I authored *A Field Guide to English/Spanish Medical Translation*. This forty-page booklet is designed as an active reference for physicians and volunteers with limited exposure to Spanish. Organized by body systems and organs, the booklet emphasizes technical vocabulary, important verbs, and practical diagnostic questions for each section. After nearly six months in Peru and Spain studying medical Spanish, the challenge of authoring this guide was to identify the terminology essential to patient care. Drawing on my own clinical experiences, I have included only vocabulary with direct clinical significance. Technical jargon has been discarded in favor of accessible layman's terms. In all possible cases, I have selected widely accepted medical terms, minimizing the effect of regional language variations. Though many exhaustive guides to medical Spanish exist, this booklet is unique for its incredibly brief and highly targeted treatment of the entire body of medical Spanish. Due to its unique approach, this booklet has the potential to achieve widespread acceptance and impact the quality and nature of medical care for the Hispanic population.

The Effect of Cognitively Challenging Talk on Oral Language Development in Low-income Preschool Children

Christopher MacLean
Dr. Paula Schwanenflugel, Department of Educational Psychology, University of Georgia

Preschool children growing up in poverty have fewer opportunities to practice complex language skills. These students begin kindergarten academically disadvantaged because language development is closely tied to early literacy and later school achievement. To learn how to enhance verbal ability within this population, a ten-week intervention was employed throughout multiple lottery-funded preschools serving low-income communities in Northeast-Georgia. Experimenters met twice a week with pairs of students to complete 500 minutes of Cognitively Challenging Conversation. Results were compared with a control group matched on EVT scores that did not partake in the intervention. Various techniques were used to elaborate on child speech including imitation, extension, expansion, recast, repetition, clarification and open-ended questions. Pre- and posttest language sampling included the use of guided conversation, speech stems and the narration of a word-less picture book. Mean Length of Utterance (MLU) was used as a measure of oral language ability. Relationships between Cognitively Challenging Conversation, MLU, academic learning and early literacy are discussed.

Under the Rug Swept: Rural Punjab Women in the Ecotone of Urbanization

Aqsa Mahmud
Dr. Fausto Sarmiento, Department of Geography, University of Georgia

The case study examines urban expansion in traditionally agricultural areas of Pakistan and its effects on the functions of rural Punjab women. Expansion of industrial activity into peripheral areas of Pakistan's Punjab creates a buffering zone which resides between two economically different regions. This mediating area features an inter-mixed economy, in a continuum inclusive of traditional farming practices and industrial employment. Hitherto, rural Punjab women exist as an invisible factor to family income, functioning in domestic roles and as farming aides. This role is changing with the introduction of inner-city norms and an industrial climate. Industrial expansion promotes alternate economic opportunities for women and urban growth increases awareness in health and education sectors. Data collected through house call surveys shows female participation primarily in the informal economy. Industrial

presence and the growth of urban housing offers work options for women and allows for multiple income-earners within a household. Interviews with health personnel stress the importance of women's role in health education of rural areas. Women are the primary patients at Basic Health Unit facilities and are important in community awareness campaigns. As more schools open in the area, effort is exhibited to obtain formal education for both genders and provide female teachers, one of the few formal economic activities with female participation. This study concludes the alteration of gender-role activities among rural Punjab women as a reaction to urban expansion; the Punjab women case study can also be applied to better understand the dynamics of farmscape transformation in peripheral regions of developing countries.

Expression and Renaturation of Recombinant HL-1, a Lectin-like Protein That May Function as a Type II Diabetes Therapeutic

Anant Mandawat & Bradley Allen
Dr. Michael Pierce, Department of Biochemistry & Molecular Biology, University of Georgia

Recent studies have found that human lectin-1 (HL-1, omentin, intelectin) is a secretory protein released from adipose tissue. It has been reported to function as an adipokine that when used in conjunction with insulin, improves glucose uptake in adipocytes. In addition to its previously theorized immune function, the adipokine results may link HL-1 to a function in type II diabetes. Our research hopes to elucidate the role or roles of HL-1 via its expression in bacteria and analysis. The HL-1 DNA sequence with an added 6-His tag was cloned into a pET vector using restriction enzyme sites. The vector was then transformed into BL-21 cells, and the HL-1 insert was expressed using IPTG induction. The BL-21 cell components were retrieved and stained for HL-1. After several washes to isolate the protein, the sample was subjected to refolding to solubilize the protein. The presence of isolated HL-1 was confirmed using Commassie staining and Western blotting. Purified HL-1 will be used with radiolabeled glucose to assay glucose uptake in adipocytes. If successful, HL-1 would be an important treatment to combat insulin resistance, the cause of type II diabetes. In addition, experiments on a carbohydrate microarray will be performed on the lectin to determine its binding specificity. The binding specificity will provide clues to the immune function of HL-1 as well as its mechanism of action in adipose tissue.

Gone but not – Making Dance through Improvisation

Mary Mattmann
Prof. Rebecca Enghauser, Department of Dance, University of Georgia
(Laura Burgamy, Leah Chapman, Marie Danielle Clark, Emily Crate, Caitlin Cunningham, Leslie Gibson, Cara O'Grady)

Gone but not is a study in using words rather than music to develop movement vocabulary. The poetry, by Pablo Neruda, was used to create an atmosphere as well as a theme for the movement, which is the desire by the human race to leave a trace and not be forgotten by the world when they have left it. The goal of the work is to create an emotional reaction to the theme as well as create a connection between the audience and dancers, who use both their voice and their bodies to communicate the theme. The piece uses modern and contemporary movement vocabulary that was developed both as a direct response to the words of the poem as well as an indirect response to the literary theme of the piece. Although much of the choreography is set, the dancers have the freedom in many areas to improvise their movement, creating a more genuine representation of the theme from each dancer. The dancers were also given verses of the poem and created their own movement in response to those excerpts, which was later set as part of the choreography. The ability of the dancers to self-determine much of the piece was a critical part of the creation of this work. Each performer draws upon her own dreams, goals, and desires, and in order to communicate that idea, in hopes that the individual voices of the dancers shines through. This universal notion could be portrayed in movement in a number of

ways; communicating this idea serves as our central inspiration.

Models of Diversity
Dakia McCray – CURO APPRENTICE
Dr. Victoria Plaut, Department of Psychology, University of Georgia

To address the problem of interracial and intergroup tension, scholars have made efforts to promote different ideologies. The major of these are multiculturalism and colorblindness. Colorblindness says that people of varying races/ethnicities hold essential similarities and should therefore be treated as individuals rather than identified with a social group. This position often leads to pressure to assimilate as well as loss of cultural identity. Multiculturalism, as it is generally understood, is the advocacy of a society that is inclusive of distinctive cultural groups equal in status. Previous research has examined the prevalence of these two models and their popularity among majority and minority groups (Plaut and Markus, 2005). In the current research we are interested in how these models of diversity relate to social status. In one experiment, we exposed participants to either multiculturalist or colorblind ideologies in addition to a control group. After the experimental manipulation, participants completed two dependent measures: the Social Dominance Orientation (SDO) scale and a resource allocation task that assessed their willingness to support diversity-related organizations. We found that these ideologies did indeed affect attempts to preserve status. In a second experiment, we exposed participants to two different status levels. These levels were represented by a CEO and a bank teller. Following the manipulation, the participants completed two measures of diversity attitude in the workplace. Through this experiment, we are looking to see whether status influences people's attitudes toward diversity. We will seek to find a way that these models can minimize threat and decrease intercultural conflict and hostility.

Determining Cost of Medical Sharps Disposal at a Local Health Center in Uganda
Andrew C. McKown
Dr. Robert T. Chen, Centers for Disease Control & Prevention

In the recent decades, single-use disposable syringes have replaced sterilizable syringes in health care settings in order to curb disease transmission through reuse of sharps. However, the consequent generation of infectious medical sharps waste also poses health risks if the waste is not properly contained. In resource-scarce developing countries, health systems often under-budget for health care waste disposal because of lack of knowledge of expenses, necessitating an easy tool by which to measure and plan for actual disposal costs of medical sharps. This study field-tested a preliminary spreadsheet tool for costing of medical sharps disposal in developing countries, including all labor, capitol, and operating expenses. Over a six-week period all medical sharps were inventoried and tracked through usage and disposal at a rural health center in eastern Uganda, during which time the health center changed from simple open pit burning of waste to encapsulation of sharps waste. The cost of disposal via open pit burning and encapsulation were measured at US$0.027 and US$0.029 per syringe, respectively. The cost of the introduction of a more appropriate system of medical waste pits was also estimated, at US$0.036 per syringe. The study experience demonstrates that proper budgeting for waste disposal is feasible because the cost of disposal is measurable with a simple tool. Furthermore, the measured costs of sharps disposal approach the purchase price of syringes, thus confirming the importance of budgeting for sharps disposal. The spreadsheet tool is being developed for widespread use in the future.

The Path Less Taken: A Progressive Approach to Stem Cell Extraction and Grading

William Colter McWhorter & Naseem Esteghamat – ROOSEVELT @ UGA
Dr. J. David Puett, Department of Biochemistry & Molecular Biology, University of Georgia

Human embryonic stem cell (hESC) research has ascended to the forefront of national controversy in the past decade. Despite further research and developments in other stem cell sources, hESC research is still the most effective method for deriving stem cell lines and potential disease treatments. An alternative method, which may appeal to those traditionally against hESC research, must be considered by the U.S. Congress. This method promotes utilizing nonviable embryos generated by in-vitro fertilization (IVF) clinics that would normally be discarded because of their low potential for developing into a fetus and likelihood of endangering the mother. Although unfit for implantation, these embryos would be ideal for research and generation of stem cell lines. As a preliminary step in supporting this method, the federal government must support developing a nationally recognized and federally regulated method for grading IVF–generated embryos in order to assuage political doubts and foster basic medical and scientific research developments. Federal scoring of embryos, through statistically-based biological aspects such as cleavage abnormality, structural inconsistency, and time frozen, along with federal oversight and funding would provide a solid foundation for hESC research. Under the supervision of the National Institutes of Health, unfit embryos would be transported from IVF clinics and passed to researchers. Derived embryos would require written consent through the IVF donor couple. Implementing these policies at the clinical level is essential to show the real value of alternative derivation. It will be a key measure on the road to full government support of hESC applications.

Egyptian Life, As Represented in *Adrift on the Nile* and *Zaat*

Yael Miller
Dr. Sherry Lowrance, Department of International Affairs, University of Georgia

The period of Nasser and Sadat in Egyptian history is a complex and fascinating time. Novels, plays, and non-fiction work abound concerning the era, as writers attempt to signify the importance of nationalism and modernization during the time. Sonallah Ibrahim and Naguib Mahfouz, in respective novels, tell the story of different sectors of society during the period. Two novels were analyzed in order to develop theories regarding Egyptian life during the period, while taking into account historical background. While Ibrahim attempts to convey the struggle of the "common" Egyptian woman during the Nasser, Sadat, and Mubarek's reigns, Mahfouz writes concerning a group of bourgeois intellectuals during the later years of Nasser. Nationalism, economic reform, and the status of various groups in Egyptian society at the time all influenced the lives of Egyptians. Class relations and Egyptian politics are both subjects of Sonallah Ibrahim's *Zaat* and Naguib Mahfouz's *Adrift on the Nile*. Egypt's political situation in both novels shows the process of change, with Mahfouz beginning with the time of Nasser and Ibrahim concentrating more on Sadat. Ibrahim specifically underscores the suffering and the isolation of the middle and lower class Egyptians, while Mahfouz demonstrates the boredom and eventual downfall of the upper class. In both novels, class interaction is close to nonexistent, and while, both novels may not be universal examples of Egyptian life, it is possible to ascertain important information from both regarding Egyptian life and its complexities.

US Involvement in the Reconstruction of Lebanon

Yael Miller – ROOSEVELT @ UGA
Dr. Sherry Lowrance, Department of International Affairs, University of Georgia
(Yael Miller, Jonathan Pride – ROOSEVELT @ UGA)

Once called the "Paris of the Middle East," Lebanon was known for its tolerance and diversity among its Christian, Muslim, and Druze factions. Its democratic traditions, its widely-publicized "Cedar Revolution," and its history of diverse tradition stemming from years of foreign rule and intervention, have given Lebanon a unique standing amongst Arab nations. Lebanon has sustained one of the region's few functioning, though fragile, democracies and the only Arab democracy to date. A secure Lebanon would provide the United States a solid, moderate ally, in a region where the United States needs another. Lebanon's recent conflict with Israel has highlighted weaknesses in the Lebanese government; Hezbollah poses a serious threat to the Lebanese government's sovereignty. In order to determine a course of action regarding US involvement in the reconstruction of the state, data were gathered concerning Lebanese history, historical records of other conflicts where the US has supported reconstruction efforts, and other positive, economy-building initiatives in other war-torn areas. A public works program supported by US aid will enforce a collective civil identity and promote community in war-damaged regions and throughout Lebanon; furthermore, those who once turned to militias for financial and community support will find new opportunities in the public works system. In addition, by strengthening the Lebanese military, the country of Lebanon may physically improve the slow process of dismantling all interior militias, including the military wing of Hezbollah, that threaten the very existence of the fragile government. A reconstruction effort beginning with a public works program will provide an innovative start to strengthening Lebanese sovereignty.

An Empirical Study of Government and Dissident Interactions in Cambodia and Indonesia, 1980-2005

Maggie Mills – CURO APPRENTICE & CURO SUMMER RESEARCH FELLOW
Dr. Stephen Shellman, Department of International Affairs, University of Georgia

There is an abundance of literature which deals with the way governments react to the dissident groups within their borders. However, the majority of this material analyzes the relationship quantifiably through the two variables of government and dissidents in a two-actor model. The literature fails to take into account the fact that multiple dissident groups have different goals, ideologies, and behave in different manners, and they should not be analyzed as a single actor or coalition of groups, especially if a coalition fails to exist. My research will act as a case study using the results from a conference paper on disaggregating dissident groups I have worked on with Dr. Shellman. My research will take into account the number of dissident groups and will analyze the relationships between the government and the groups through a multivariate vector auto-regression test, as well as through the difference of means test. These tests will show whether a dissident group's actions are dependent upon different types of cooperation and repression coming from the government, as well as the success or failure of tactics used by other dissident groups. To perform these tests I will use the Project Civil Strife data for Cambodia and Indonesia. In the future, this project will include other countries in order to validate the results coming from Cambodia and Indonesia or show how situations and the dynamics of different countries affect these interactions. Eventually I would like to look at my results and deduce whether certain governmental actions deter more action from dissident groups than other policies and actions; these conclusions can provide me with the information I would need to make viable policy prescriptions based upon my research.

Differential Modulation of Anxiety-like Behavior in Syrian Hamsters by Endocannabinoids and Benzodiazepines

Anna M. Moise – CURO SUMMER RESEARCH FELLOW
Dr. Andrea G. Hohmann, Department of Psychology, University of Georgia

We tested the hypothesis that endogenous cannabinoids would suppress anxiety-like behavior in Syrian hamsters through activation of cannabinoid CB_1 receptors. Animals were evaluated in one of two distinct behavioral paradigms − a conventional model of anxiety (the elevated plus maze) or a naturalistic model of social stress (social defeat). Hamsters received an inhibitor of endocannabinoid deactivation (URB597), a cannabinoid CB_1 antagonist (rimonabant), a benzodiazepine anxiolytic (diazepam) or vehicle. Inhibition of endocannabinoid metabolism with URB597 induced a CB_1-mediated suppression of anxiety in the elevated plus maze. Blockade of CB_1 with rimonabant increased anxiety-like behavior. URB597 and diazepam decreased entries into closed arms of the maze, consistent with anxiolytic effects. By contrast, rimonabant decreased entries into open arms of the maze, consistent with anxiogenic effects. We used a naturalistic model of social anxiety to evaluate the effects of the same pharmacological manipulations on social defeat. Following exposure to a larger dominant hamster, subordinate hamsters display submissive behavior even in the presence of a smaller, nonaggressive hamster. We tested the hypothesis that this conditioned defeat would be suppressed by conventional anxiolytics such as diazepam and inhibitors of endocannabinoid deactivation such as URB597. Diazepam suppressed the expression, but not the acquisition, of conditioned defeat. By contrast, URB597 and rimonabant, administered at doses that modulated anxiety-like behavior in the elevated plus maze, did not alter conditioned defeat. Our data demonstrate that URB597 and diazepam differentially modulate anxiety-like behavior in male Syrian hamsters. Moreover, conditioned defeat is not dependent upon cannabinoid CB_1 receptor activation.

Gene Knockout Analysis of Two Putative Xylanase-regulating Transcription Factors in the Rice Blast Fungus

Lamar H. Moree – CURO SUMMER RESEARCH FELLOW
Dr. Alan Darvill, Departments of Biochemistry & Molecular Biology, Plant Pathology, University of Georgia
Dr. Sheng-Cheng Wu, Complex Carbohydrate Research Center, University of Georgia

Magnaporthe grisea is the causal fungal agent of rice blast disease, which is responsible for the annual loss of about 200 million tons of rice output worldwide. Under various growth conditions, *M. grisea* secretes numerous extracellular proteins important for growth, development, pathogenicity, and molecular signaling. Among these proteins are many hydrolytic enzymes that macerate the host plant cell walls. In the industrial fungus *Aspergillus niger*, production of cell wall-degrading enzymes is regulated by a transcription factor, XlnR, which has two homologs in the *M. grisea* genome (*MgXR1* and *MgXR2*). To determine the biological function of *MgXR1* and *MgXR2*, gene knockout analysis was performed on each gene. One Δ*mgxr1* and two Δ*mgxr2* mutants were confirmed by Southern Blot analysis. Both mutants were cultured on minimal media with rice cell walls as the sole carbon source. Mycelia weight, xylanase activity, and RNA transcripts of the cultures were quantified and compared to those of the wild-type strain. On Day 5 post-inoculation, both mutants out-grew the wild-type by 20-30% in terms of fresh fungal mass; however, the mutants secreted only about 5% as much xylanase as the wild-type. Surprisingly, the RNA concentration for each of the six xylanase genes measured appeared to vary from gene to gene and culture time to culture time, ranging from severe reduction to enhancement in expression level. The radial growth of both mutants on monosaccharides, particularly on xylose, exceeded that of the wild-type by over three fold. These results indicate that MgXR1

and MgXR2 are functionally similar to XlnR, but neither positively nor directly regulates the transcription of a set of individual xylanase genes.

Zeolites of Eastern Uganda and Their Scientific, Social, and Economic Potential
Mia Catherine Morgan
Dr. William Kisaalita, Department of Biological & Agricultural Engineering, University of Georgia

In an ongoing study at the University of Georgia, the mineral zeolite is being used in the development of a cooling system, which would provide milk cooling for small dairy farmers who do not have access to electricity. The zeolite in the system plays a crucial role in the vacuum adsorption technology used in the cooler. There are over two million farmers in Uganda alone who greatly need this technology, and the discovery of zeolite in Uganda would not only lower the cost of the cooler, making it more affordable, but will also open up possibilities for other applications. Some of these applications include liquid purification and clarification, deodorizers, desiccants, construction materials, etc. The goal of this research is to determine whether rock samples collected during an eight week, on-site research project in Uganda, East Africa, are one of the more than 40 naturally occurring zeolite species. A natural zeolite is a framework alumino-silicate whose structure contains channels filled with water and exchangeable cations. Rocks are currently being tested using Thermogravimetric Analysis (TGA) as well as Nuclear Magnetic Resonance (NMR). Results of these tests will be presented. Also, this research will examine the potential social and economic impact of discovering zeolite in Uganda.

African Immigrant Integration in Post-industrial Western Societies
Yannick Morgan
Dr. Abdulahi Osman, Department of International Affairs, University of Georgia

Immigration issues have recently become especially important since several Western countries have experienced major acts of violence involving their immigrant populations. What are the factors that affect the way African immigrants are integrated into the Western societies of France, the Netherlands, and the United States? Demographic information about the immigrant populations, relevant news reports, and reviews of the national legal, political, and social attitudes about immigration all contribute to the conclusion reached here. That is to say, the factors that arise from this analysis include the following: first, while European majority populations are focused on their growing Muslim populations (much of which originate from African states) due to the recent increased visibility of political Islam, in the United States, the immigrant group more prevalent in the national discourse is the illegal Hispanic population coming from Mexico and Central America. Second, African immigrants to France and the Netherlands include a greater number of individuals with lower incomes than the national average and of Muslim descent, while in the United States, African populations are drawn more from sub-Saharan Africa and represent one of the more wealthy immigrant groups in the States. These factors – social domestic focus and characteristics of incoming immigrants – affect how African immigrants are able to integrate into these western societies. While in the United States, African immigrants are able to integrate more fully, flying under the Nativist radar, whereas in the Western European countries of France and the Netherlands African populations have had greater difficulty integrating into the majority populations.

Evaluation of Direct Plating Methods to Enumerate *Alicyclobacillus* in Beverages

Melinda B. Murray – CURO SCHOLAR
Dr. Larry R. Beuchat, Department of Food Science & Technology, University of Georgia

The development of a standard direct plating method to enumerate *Alicyclobacillus*, a spoilage bacteria known to survive heat pasteurization processes applied to fruit, vegetable, and fruit/vegetable-based beverages, has been difficult because of varying pH and temperature optima for growth of some strains of *Alicyclobacillus* species. Ten agar media were evaluated for their suitability to support spore germination and colony development by six strains of *Alicyclobacillus acidoterrestris*, three strains of *Alicyclobacillus acidocaldarius*, and one strain of *Alicyclobacillus cycloheptanicus*. The influence of plating method, incubation temperature, and incubation time on colony development were determined. K agar, *Alicyclobacillus* medium (ALI agar), and *Bacillus acidoterrestris* thermophilic (BAT) agar recovered the highest numbers of spores. Orange serum agar and Hiraishi glucose yeast extract agar were the least suitable. Overall, surface plating was superior to pour plating and, with the exception of one strain of *A. acidocaldarius* which grew better at 50°C, incubation of K agar, ALI agar, and BAT agar plates at 43°C or 50°C resulted in recovery of equivalent numbers of spores. Essentially all viable spores were detected on media incubated for three days at 43°C. The ability of one strain of each *Alicyclobacillus* species to grow in ten non-carbonated commercially manufactured beverages at 30°C and 43°C was markedly affected by the composition of the beverages. Results show that surface plating samples on BAT agar, followed by incubating plates at 43°C for three days provide suitable conditions to enumerate ten strains of three species of *Alicyclobacillus* most commonly responsible for spoilage of beverages.

Annotation of Cuticular Protein Genes in *Anopheles gambiae*

John Nagao
Dr. Judith Willis, Department of Cellular Biology, University of Georgia

Cuticular proteins make up the exoskeleton of insects. Their genes are excellent targets for research because they are developmentally regulated and abundantly expressed. The largest family of cuticular protein genes can be identified by the R&R Consensus, a highly conserved short amino acid sequence. *Anopheles gambiae* is an ideal candidate for research on cuticular protein genes because its genome has recently been sequenced. There are over 150 cuticular protein genes with the R&R Consensus in *A. gambiae*; although they belong to the same gene family, the temporal pattern of expression of these genes varies. Studying the genes for these proteins may provide significant insights into how genes are regulated. Genes for six cuticular proteins are located on the X chromosome of *A. gambiae*, but are not closely linked as are many other cuticular protein genes. There was no supporting evidence for the annotation of four of the genes. To verify the annotations, selected cDNAs was inserted into a plasmid vector and amplified in bacteria. The plasmids were then purified and sequenced. Sequences were obtained for two of these genes and I am working on the others. Temporal expression patterns for all six genes have been determined using real-time PCR, with each gene showing a distinct pattern of expression.

Effects of Glycerol on Processing of Kit Ligand Mutants in Mammalian Cells

Nithya M. Natrajan – CURO APPRENTICE
Dr. Mary Bedell, Department of Genetics, University of Georgia

Kit ligand (Kitl) is the ligand for the receptor tyrosine kinase Kit and is required for the development and proliferation of germ cells, melanocytes, and hematopoietic cells in multiple animals. In humans, abnormal Kit signaling pathways are involved in several diseases, including tumor development and pigmentation

disorders. Additionally, Kitl is used clinically to increase peripheral blood progenitor cells prior to autologous transplantation. Despite numerous studies, many aspects of the molecular mechanisms of Kitl function remain unknown. In order to obtain more information on Kitl, we are studying a series of mouse Kitl mutants. Preliminary studies suggested that some mutant Kitl proteins become misfolded and trapped intracellularly, preventing them from reaching the cell surface. Other studies revealed that glycerol acts as a chemical chaperone to stabilize misfolded proteins, thus allowing their transport to the cell surface. This project will test whether treatment of cells with glycerol will restore transport of Kitl mutant proteins to the cell surface. If glycerol does not act as a chemical chaperone for Kitl mutants, studies with other common chemical chaperones will be conducted. Once a chemical chaperone for Kitl mutants is identified, the functionality of the mutant proteins on the cell surface will be studied. The results of this experiment will contribute to knowledge on structural aspects of Kitl function and will be applicable to other growth factors with similar structures. In addition, further understanding of the actions of chemical chaperones will aid in the development of pharmacological chaperones that can be used therapeutically.

HESX1 Mutations in Idiopathic Hypogonadotropic Hypogonadism
Nithya M. Natrajan – CURO APPRENTICE
Dr. Lawrence Layman, Department of Obstetrics & Gynecology, Medical College of Georgia

Idiopathic hypogonadotropic hypogonadism (IHH) is characterized by the absence of puberty and low serum levels of the gonadotropins follicle-stimulating hormone (FSH) and luteinizing hormone (LH). Homeobox expressed in embryonic stem cells-1 (Hesx1) is involved in the early differentiation of the anterior pituitary into five cell types. Mutations in Hesx1 have been associated with Septo-optic dysplasia (SOD), isolated growth hormone deficiency (IGHD), and combined pituitary hormone deficiency (CPHD). Panhypopituitarism, midline brain abnormalities, and optic nerve hypoplasia are the characteristics associated with SOD. Human HESX1 is a good candidate gene to study in patients with IHH because of the role it plays in SOD, IGHD, CPHD, and pituitary development. To determine if HESX1 mutations occur in IHH patients, DNAs were subjected to PCR for exons 3 and/or 4. These PCR products were sequenced and analyzed to find potential mutations. Sorting Intolerant from Tolerant (SIFT) was used to determine if missense mutations in the coding region might affect the protein. In this study, three potential heterozygous mutations were identified; one was a missense mutation (Q143E) and two mutations were identified together in the 3' untranslated region (UTR) (2043A>C and 2105G>C). These potential mutations must be studied further to determine if they affect the function of the protein. If these mutations are shown to affect protein function, then mutations in HESX1 may be a cause of IHH.

Curbing Private Forestland Divestment: Research into Georgia's Private Forests
Jesse N. Oakley – CURO APPRENTICE & CURO SUMMER RESEARCH FELLOW
Dr. Dr Laurie Fowler, Institute of Ecology, University of Georgia

Approximately 66% of Georgia's land is forested. Recently, divestment trends in the timber industry led to a massive sell-off of over three million acres. We want to understand why this is occurring, what affect it has on the environment of Georgia, and what tools can be implemented and utilized to curb forest loss. The lands were sold to developers who cut the forests and further subdivided acreage for homes or commercial growth. These forests provide society with benefits such as improved air and water quality, and habitat for wildlife. The consequences of this development include storm water discharge due to increased impervious surfaces, habitat fragmentation, altered air quality, and increased loss of biodiversity. Data collected will establish the detrimental affects divestment has on the environment and the tools available to landowners that aid in conservation.

The data will be collected through normative research, interviewing experts of the timber field and reading examples of conservation purchases around the state of Georgia and around the United States. Collected will be evidence of forest conservation and how the people conserved the land by the use of easements, leases, and other forms of Joint Purchase Agreements. We want to comprehend how some Joint Purchase Agreements were successful while others failed; also, we seek to understand different economic and social interests in these agreements. The research will have bearing on land development and the future of Georgia's forests. The study will illuminate the need for action and the availability of conservation that is both economically and ecologically rewarding.

Brief – Solo Study Utilizing Crafting Devices in Dance Choreography

Cara O'Grady
Prof. Bala Sarasvati, Department of Dance, University of Georgia

Brief arose as a solo study while learning and practicing the use of crafting devices to develop choreography in a dance composition course. The vocabulary chosen was simple and selected from the modern dance genre. The project began as a chance to utilize different forms, speed, levels, and perception of eight different movements. These actions were chosen by physically and internally exploring how the ideas of vulnerability, detachment, abandonment, regret, and reaction as expressed in human body language. The movements were then modified to be only an abstract interpretation. This abstraction created potential for broader viewer and performer interpretation and experience. After selecting and honing appropriate vocabulary, I set about examining how many different ways the movement could be performed in a repetitious manner. Augmentation, both of space and time; together and separate, were first used. Then the perception and angle of the movement was varied to vary audience perception and possible reaction. Likewise speed, body parts, transposing, effort, loco-motor and non-locomotor elements were shifted, rearranged and added. Finally, with the developmentally structured new arrangement, the elements of music and personal performance were added as layers to morph the attitude and overall effort quality of the work. Peers, and mentor faculty member Bala Sarasvati, for clarification and precision of intent, reviewed the work.

Gender Meaning Parity and the Gay Movement: A Cross-cultural Study of Developing Movements

Noona Oh
Dr. Dawn Robinson, Department of Sociology, University of Georgia

The development of the gay movement is increasingly visible on the international stage with the multi-national emergence of gay and lesbian rights movements. This research examines the role of gender parity in the development of gay and lesbian movements in Canada, China, Germany, Japan, and United States. It compares the cultural meanings associated with gendered and sexual identities in the five nations to ascertain the relative favorability of social environments conducive to gay and lesbian movement success. Variations along the Evaluation, Potency, and Activity (EPA) meanings of these identities revealed the social and cultural basis from which a gay movement operates and also predicted the probability of a mature or undeveloped movement. Country rankings were derived from calculations of EPA disparities between man and woman identities and formed the predictions for movement maturity. These predictions were tested with a qualitative analysis of movement development using a coding scheme indexed along six dimensions of movement success. Observed rankings based on movement success largely reflect the initial rankings derived from EPA measures of gender meaning differences. Countries with greater gender meaning equality have mature gay and lesbian movements while countries with greater disparities in gender meanings tend to have less developed gay and lesbian movements. In addition, the relative affective meanings of homosexual identities

closely reflect the actual development trends in the gay movements and capture important differences between them.

Characterizing PGMRC1, an Enzyme Suspected in the Regulation of the Cytochrome P450 CYP51A1

Ezinne A. Okwandu
Dr. William Lanzilotta, Department of Biochemistry & Molecular Biology, University of Georgia

Cytochrome P450s are ubiquitous heme-containing proteins that play crucial roles in several biosynthetic and drug metabolism pathways in humans. My research focuses on a novel regulation mechanism for the human P450 enzyme, CYP51A1, by the progesterone receptor membrane component-1 protein (PGMRC1p). CYP51A1 is required for lanosterol demethylation during ergosterol synthesis in humans. The PGMRC1 protein is a member of the membrane associated progesterone receptor binding proteins and has been proposed to regulate cytochrome P450 activity in the biosynthesis of cholesterol by directly activating and/or inhibiting the lanosterol 14α- demethylase enzyme. These observations have fostered the hypothesis that PGMRC1 may have a broader role in activation of P450 enzymes involved in the degradation of cancer drugs. Given the diverse functions of P450s in general, it is important to understand how heme interacts with PGMRC1 and how the heme-PGMRC1 complex alters cytochrome P450 activity. At the present time research has focused on characterizing the biophysical properties of the yeast homolog (with and without heme bound). In order to characterize the human enzyme, we have initiated a study to express PGMRC1 successfully, optimize purification of the protein and begin to analyze the biophysical properties of the protein. In addition, the heme concentration was also measured and crystallization trials have been initiated in order to eventually determine the structure of protein using X-ray crystallography. NMR spectroscopy shows that in the current buffer conditions the purified protein exists predominantly as a molten globule and therefore a search for new buffers has been initiated.

Tax Binding to Various CBP Domains

Ezinne A. Okwandu
Dr. Jennifer Nyborg, Department of Biochemistry & Molecular Biology, Colorado State University

The Tax protein is a potent transcriptional activator that stimulates the expression of the Human T-cell Leukemia Virus type 1 (HTLV-1) provirus. HTLV-1 is a retrovirus that causes human T-cell leukemia. Previous studies have shown that Tax interacts with the cellular transcription factor CREB and viral cyclic AMP response elements (vCREs) in the viral promoter to recruit the pleiotropic coactivators CBP and p300. The interaction of Tax, vCREs, CREB and the CBP/p300 proteins recruits transcriptional machinery beginning the transcription of viral DNA inside the host cell. Although the mechanisms behind Tax's role as a transcriptional activator are not fully understood, Tax binding to various CBP domains has been explored in detail. Previous research indicated that the interaction between Tax and the KIX and C/H1 domains on CBP is believed to be responsible for the recruitment of the coactivators to the HTLV-1 promoter. More recent research studies show that Tax interacts with a domain located towards the carboxy-terminus of CBP, known as CR2. This study compares Tax interaction with the, KIX domain, C/H1 domain, KIX and C/H1 fusion domain and the CR2 domain in the presence of vCREs and CREB *in vitro* using western blots. The bands were quantified using Imagequant application software. The experiments showed strong Tax binding to the CH1/KIX and KIX domains and some Tax binding to the CR2 binding. Unraveling the mechanisms of Tax binding to the viral promoter may help solve the mystery surrounding the reproductive cycle of retroviruses such as HIV and the HTLV-1.

Kinetics of Inhibition of Polygalacturonases and Polygalacturonase-inhibiting Proteins
Victor M. Orellana – CURO APPRENTICE
Dr. Carl Bergmann, Complex Carbohydrate Research Center, University of Georgia

*Endo*polygalacturonases (EPGs) are important fungal pathogenicity factors, and are among the first enzymes secreted when fungi are grown on isolated plant cell walls as a sole carbon source. EPGs hydrolyze deesterified regions of wall-bound homogalacturonans, opening up the wall to the action of other *exo*- and *endo*glycanases. During pathogenesis, interactions between fungal EPGs and plant-derived polygalacturonase-inhibiting proteins (PGIPs) may alter the hydrolytic activity of the EPG**.** EPGs from a single strain of fungus may exist in a variety of isoforms and may vary in their mode of action as well as in their ability to interact with, and be inhibited by, PGIPs. In addition, the PGIPs of a single species may be present as a set of isoforms. The mode of action of a particular fungal EPG and its inhibition by PGIPs may be critical factors in determining whether the fungus is a viable pathogen. In the last few years, work by our lab and others have begun to unravel the mechanism of action and of inhibition. We have used mass spectrometry, surface plasmon resonance spectrometry (SPR), and molecular modeling to study the binding site of the EPG for its homogalacturonan substrate and the mechanism of substrate cleavage. We have also used these same techniques to investigate the binding of EPG to PGIP and the interaction between these two proteins. The literature on the kinetics of inhibition is, however, somewhat contradictory. In response to this problem, the work presented here is part of a detailed kinetic analysis of *Aspergillus niger* EPG-PGIP interactions.

Gentrification in Athens, Georgia: A Two-sided Coin in a County with the Fifth Highest Poverty Rate in the Nation[1]
Katie Orlemanski – CURO SUMMER RESEARCH FELLOW, CURO SCHOLAR
Dr. Patricia Richards, Department of Sociology, University of Georgia

The purpose of this thesis is to clarify the concept of gentrification. I examine a range of definitions and theories that have been explored since the coining of the term by Ruth Glass in 1964. I outline why the study of gentrification is important to anyone interested in the physical, economic, social, and/or cultural aspects of urban space. Because I argue that there is no single coherent vision of the meanings, causes, and experiences of gentrification, the latter part of this paper examines a specific gentrification encounter through a case study of development in Athens, Georgia. Within the methodology section, I discuss the meaning and importance of my actor-oriented approach to research based in interviews with community members and some of the benefits and difficulties it posed. An analysis of my research from Athens follows that applies the theoretical concepts of gentrification introduced earlier. The conclusion of this thesis offers suggestions for confronting gentrification issues in Athens, Georgia while also posing questions that need further examination. It is my hope that this thesis will help shed light on the various experiences of gentrification in Athens in order to promote a more comprehensive development policy for the city.

The Effects of Heat Shock on the Lethality of Subsequent Infection in *Drosophila melanogaster*
Katharine A. Owers, CURO SCHOLAR
Dr. Daniel Promislow, Department of Genetics, University of Georgia

When an organism receives a heat shock, heat shock proteins (HSPs) are synthesized, conditioning the organism and making it more

[1] For counties with populations 100,000 or more

resistant to later heat shocks. Infection, like heat shock, is a stress that releases HSPs, but the relationship between heat shock and infection has so far been studied little. Because heat-induced HSPs help organisms deal with later heat stress, I predict that they also help fight stress from infection and thereby decrease the lethality of disease. I also predict that the effects of heat-shock on lethality are temperature-dependent. These hypotheses are being tested with *Drosophila melanogaster*. One group of flies is heat shocked prior to infection, while the other is only infected. Flies were infected with *Lactococcus lactis,* a gram-positive (toxin-releasing) bacterium, at a dose causing death of between 50 and 60 percent of infected flies. Post-infection, flies were incubated at various temperatures. The effects of heat shock were measured by comparing mortalities of the different treatment groups. Preliminary results are inconclusive, but if heat shock affects susceptibility to disease in *D. melanogaster*, then increased temperatures, such as those under global warming, might constitute a heat stress that could change the lethality of disease. Because *D. melanogaster* is a model for ectotherms, including many economically important organisms, these results could have broader implications.

Infectious Plant Pathogen: *Botrytis cinerea*
Shreyal C. Patel
Dr. Carl Bergmann, Complex Carbohydrate Research Center, University of Georgia

Botrytis cinerea is a widespread plant pathogen that causes grey mold or soft rot on the host tissues and is responsible for significant economic losses. *B. cinerea* must breach the cell wall during the infection process and accordingly secretes multiple enzymes that can degrade cell walls. Among these cell wall-degrading enzymes are endopolygalacturonases (EPGs), which are some of the first enzymes secreted. Thirteen EPG isoforms have been described in *B. cinerea*, although the possible functions for each in pathogenesis have not been fully elucidated. Six *B. cinerea* genes encoding EPGs have been studied and the results indicate that each gene is differentially expressed depending on factors such as the stage of infection, the plant species and the temperature. A focus of my research is the interaction during pathogenesis between fungal EPGs and plant cell wall derived inhibitors of EPGs known as polygalacturonase-inhibiting proteins (PGIPs). The mode of action of a particular fungal EPG and its inhibition by PGIPs may be critical factors in determining whether the fungus is a viable pathogen. The glycosylation patterns on the EPGs and PGIPs have been implicated in the way these two classes of proteins interact, and there is some evidence that glycosylation may change during pathogenesis. In this research, we undertook a complete mapping of the patterns of glycosylation on the EPG BcPG3. These results will serve as the basis for future site-mutations in order to dissect the role the different carbohydrate side chains play in pathogenesis and EPG-PGIP interactions.

Developing a Biocontrol Agent for Chinese Privet, *Ligustrum sinense*
Tulsi Patel – CURO APPRENTICE
Dr. Scott Gold, Department of Plant Pathology, University of Georgia

Ligustrum sinense, commonly known as Chinese Privet, is an exotic weed that currently invades millions of acres of land in the southeastern United States. The weed has the potential to outcompete many native species because it grows in various climatic conditions, and birds and small animals rapidly disseminate its seeds by consuming Privet fruits. Although privet is one of the most harmful weeds in the southeastern United States, there is no efficient mechanism to control its growth. The purpose of this project is to develop a cost effective biocontrol agent for *L. sinense*. This goal may be achieved by using a fungal pathogen that secretes large amounts of an amino acid that is detrimental to privet. The first step in finding such a fungal pathogen is to identify an amino acid that is toxic to Chinese privet. Preliminary tests in which Privet plantlets were treated with nine amino acids have shown that Lysine, Methionine, and Valine are three amino acids

that are most toxic to the plants. Next, we will create a mutant fungal pathogen that secretes large amounts of one of these inhibitory amino acids and test it for host specificity. If successful, this project will provide an effective biocontrol agent for Chinese privet and a model that could be used to control other exotic weeds.

Media Development, Journalism and Democratization in Croatia
Danielle L. Pearl – CURO SUMMER RESEARCH FELLOW
Dr. Keith Langston, Department of Germanic & Slavic Languages, University of Georgia

Since declaring its independence from the former Yugoslavia in 1991, Croatia has made significant social and institutional advances toward building a truly democratic polity. Nevertheless, the independence and legitimacy of the news media pose a continuing challenge to Croatia's democratic aspirations. This project constitutes a qualitative analysis of the current state of development of the news media in Croatia, assessing what factors and conditions prevent the media there from fulfilling their role as the "fourth estate" in this young democracy. This project examined the nature and causes of constraints on a legitimate, professional and effective media in Croatia through a series of moderately structured interviews with Croatian journalists and other media practitioners associated with a variety of print and broadcast news media. An analysis of these interviews was used to identify a set of specific policy options available to the Croatian media, government, publics, and concerned non-governmental organizations to improve media independence and legitimacy in Croatia. It is hoped that the results of this research will be of further use to scholars and policymakers in fields including media studies, democratic, post-communist and post-conflict development, and contemporary Croatian politics and society.

Metropolis Monte Carlo Simulations of Thin Ferromagnetic/Antiferromagnetic Bilayers
Daniel Perry – CURO SUMMER RESEARCH FELLOW, CURO SCHOLAR
Dr. David Landau, Department of Physics & Astronomy, University of Georgia

Ferro/Antiferromagnetic bilayers exhibit several interesting properties. One such property is called Exchange Bias (EB), which is a shifting of the hysteresis loop so that it is not symmetry about zero applied magnetic field. A hysteresis loop can be observed through quantitative analysis of ferromagnets by sweeping a magnetic field from a positive value to a negative and then from a negative value back to a positive. With the addition of an antiferromagnetic layer to the ferromagnetic layer, EB is observed in the laboratory. EB effectively stabilizes a system, making it useful in hard drives and potentially other nanotechnologies. A fundamental understanding of EB is important for the field of nanotechnology, but to date, the interactions that drive EB are not fully understood. This research aims to obtain a general understanding of the interactions that produce EB by using a simple atomistic model. Metropolis Monte Carlo simulations were used on a Body-Centered Cubic lattice. The parameters that were used to explore the properties of the model were temperature, lattice size, and the interface interactions between the two films. There are 3 types of interactions: exchange, crystal field and dipole-dipole. The dipole-dipole interactions are long range and simulated using effective anisotropy in the model. The resulting data revealed phase transition temperatures, phase transition fields, and hysteresis loops. These results differed slightly with temperature, but more so with interface types. The uniform interface was found to be useful for understanding the model. The random and step interfaces were used to mimic more realistic interfaces. Thus far, none of the interactions produce EB in the model, so it can be concluded that this model does not sufficiently describe a bilayer system. These results show that

current theory concerning EB is either incomplete or incorrect.

Polygalacturonase-inhibiting Proteins and Their Relationship to Polygalacturonases
Aaron C. Petrey
Dr Carl Bergmann, Complex Carbohydrate Research Center, University of Georgia

The plant cell wall is a major barrier against attempted invasions by phytopathogenic fungi, therefore the plant cell wall-degrading enzymes produced by fungi play an important role in their pathogenicity. Endopolygalacturonases (EPGs) are responsible for much of the pectin-degrading activity of plant pathogenic fungi and are among the first molecules secreted upon fungal infection of plants. EPGs cleave the linkages between D-galacturonic acid residues in non-methylated homogalacturonan. Polygalacturonase-inhibiting proteins, or PGIPs, are important defensive proteins which exist within plant cell walls. PGIP proteins inhibit the activity of fungal polygalacturonases (PGs) which are part of the primary method of cellular invasion by fungi such as *Fusarium moniliforme*. Until recently, little was known about the mechanism of action of EPGs. There has been an equal lack of information regarding the mechanism of interaction between EPGs and PGIPs. Previous results have demonstrated that the relationship is pH dependent. Here the relationship of fungal EPGs, plant PGIPs, and PGA (polygalacturonic acid, the pectic substrate) is examined in order to determine kinetically if the inhibition of *Fusarium moniliforme* EPG by snap bean PGIP is competitive or noncompetitive. The mechanism of inhibition has been widely debated and the results of this research fit nicely with our model that the PG binds on the underside of the EPG-complex in a noncompetitive fashion. These data are in contradiction with analysis performed by other researchers and suggest the need to perform further kinetic experiments to evaluate the relationship of many PGIP glycoproteins with their EPG enzyme counterparts.

Effects of Alcohol Use on Cognitive Ability
Natalie M. Picchetti
Dr. Jennifer McDowell, Department of Psychology, University of Georgia

Inhibition allows inappropriate responses to be suppressed and appropriate responses to be made. A simple model of inhibition is based on antisaccade performance, which is presumably mediated by the pre-frontal cortex. During an antisaccade trial, participants are required to move their eyes as quickly and accurately as possible to the mirror image (opposite side; same amplitude) of a target presented in the periphery. Alcohol decreases activity in the pre-frontal cortex, and might be expected to affect antisaccade performance. Previous research has shown that individuals with alcohol dependence have increased antisaccade errors. A high percentage of errors can also be a predictor for potential susceptibility to alcohol dependence. Young adults with a family history of alcoholism make increased errors compared to those who do not. From these results it was hypothesized that normal undergraduates with heavy alcohol use will make more antisaccade errors compared to individuals with light alcohol use and that a positive relationship will exist between the number of antisaccade direction errors and extent of alcohol use. Anti-saccade performance was measured in 100 undergraduate students who were screened for alcohol and drug use. Eye movements were recorded with the infrared oculography and the data were evaluated for percentage of direction errors. Relationships between antisaccade errors and alcohol use were calculated using correlations and T-tests were used to determine any possible relationships between the two extreme groups from the entire distribution, heavy and light drinkers. The results of this experiment will be presented.

My Neighbor's Keeper: Social Capital as a Means of Mediating Extremist Activity

Andrew W. Pierce – CURO SUMMER RESEARCH FELLOW
Dr. Tom McNulty, Department of Sociology, University of Georgia

Among the benefits created by social capital, defined as the resources embedded in social networks, is reportedly a decline in extremist activity. Previous research states that isolated members of society are the most likely to join extremist movements, and that high levels of bridging social capital, which is the type of social capital that includes the most people, bring isolated individuals into society thereby precluding their involvement in extremist movements. To investigate the interaction between social capital and extremist activity, social capital indicators and hate crime data were collected for all fifty states. The social capital indicators were compiled into a social capital index at the state level which, when compared to hate crime rates at the state level, can explain patterns of extremist behavior. Regression analysis was used to measure the relationship between several social capital indicators and hate crime rates. The analysis showed that bridging social capital indicators are negatively correlated with hate crime rates to a significant degree. These results imply that strategies important to growing social capital can be viewed as strategies to decrease current extremism in the Middle East or curb the growing extremist movements in Europe.

Expression, Optimization and Crystallization of Cystathionine β-Synthase and Cystathionine γ-Lyase

Richard C. Piercy – CURO SUMMER RESEARCH FELLOW
Dr. Cory Momany, Department of Biomedical & Pharmaceutical Sciences, University of Georgia

An elevated homocysteine level in blood serum has been determined to be a significant risk factor for arteriosclerosis. In the reverse transsulfuration pathway two Pyridoxal 5-Phosphate (PLP) dependent enzymes metabolize homocysteine to the end product of cysteine. Cystathionine β-synthase(CBS) metabolizes homocysteine into cystathionine which is then metabolized into cysteine by cystathionine γ-lyase(CGL). This research is of the basic type that has the goal to develop a reproducible process to yield crystals of CBS and CGL which will be studied in order to solve the full-length structures of each. The hypothesis is that a defect in either CBS or CGL could be a leading cause of arteriosclerosis. Full structures could help confirm or deny this claim and possibly lead an alternative treatment. Modifications were made to previous protocols to crystallize CGL and CBS. Those attempted with CGL include expression in auto-induction media, French-Pressure cell press for cell bursting, and Fast-Flow Crude columns to quickly and efficiently remove cellular material from enzyme supernatant. After purifying using High Performance Liquid Chromatography (HPLC) the enzyme was then dialyzed, concentrated and added to a crystallization buffer. Concentration of purified CGL failed to yield a concentration above 10.6mg/L. Crystallization attempts to date have failed both in the lab and at the Hauptman-Woodward high-throughput facility. CBS, a heme and PLP dependent protein requires an excessive amount of heme for proper expression. The expression of CBS without a heme transport mechanism has seen mixed results in protein quality in the past so the pHEX-2 plasmid was selected for transformation along with CBS. This plasmid provides a heme-transport system for the *E. coli* host as CBS needs an excessive amount of heme to be fully translated. Double transformations into Rosetta-2 (DE3) pLysS cells have failed all double antibiotic platings to date. Further attempts will be made with different transformation techniques as well as alternative plasmids to more effectively express CBS.

Public Space in a New Urbanist Development: A Case Study of Atlantic Station

Emily Powers – CURO SUMMER RESEARCH FELLOW
Dr. Steven Holloway and Dr. Katherine Hankins, Department of Geography, University of Georgia

Situated on the 138-acre site of the former Atlantic Steel Mill in midtown Atlanta, Atlantic Station is an example of a new urbanist "mixed-use" development. The "live, work, play" design of Atlantic Station is a worthy replacement to the abandoned industrial eyesore; it has benefited the city of Atlanta and state of Georgia with its new jobs and favorable press. At the same time, questions remain about the nature of the public space available in Atlantic Station. The case study investigates the intended and the realized spaces produced by Atlantic Station as well as reveals the multiple definitions of the term "public," which are underexamined in contemporary geography literature about public space. Through qualitative investigation including interviews with Atlantic Station residents, consumers, and employees in addition to participant observation, this research reveals the degree to which Atlantic Station developers and retailers provide highly regulated spaces that emphasize walkability and shopping convenience, which are celebrated by residents and consumers alike. Atlantic Station's public is utilizing the regulated spaces, but it is not challenging the democratic spaces in question; the consumerist citizens are not searching for more representation. This "well-behaved" public is not claiming space for active citizenship but rather it is participating in the spaces so carefully designed for its consumption. It is a public space that, by all appearances, has been severed from the state.

American Investment in a Post-Castro Cuba

Lucas L. Puente
Dr. Stephen Shellman, Department of International Affairs, University of Georgia

Cuba represents a potential American investment market that is currently untapped. Currently, the U.S. imposes an embargo, banning trade with Cuba, but a repeal of this economic boycott would reap large benefits for Americans and Cubans. The presence of political resistance, economic uncertainties, and current trade alliances all pose as a threat to the opening of trade. However, significant trade and economic data from the U.S. Department of Commerce will demonstrate the objective of this research: the enormous financial potential of open trade with Cuba. Furthermore, data will be analyzed in order to show the advantages of trade liberalization for Cuba, given certain American incentives. The future of Cuban-American relations is now: the implementation of liberalized trade will catalyze Cuban-American relations for the years to come.

Effects of Mg/HA on Growth and Differentiation of Osteoblast Cells (Bone Cells) in a Hydroxy Apatite Scaffold

Crystal Rapier
Dr. William Kisaalita, Department of Biological & Agricultural Engineering, University of Georgia

Biodegradable polymer scaffolds are currently being widely investigated in the effort to create both a reliable and efficient support mechanism to promote the growth of new bone tissue. Many of the current metal, synthetic cement and bioceramic materials being used have numerous limitations. There is an imminent need for alternative bone biomaterial therapies that promote natural, rapid, controlled, and healthy cell growth that will improve the quality of life for the thousands of people who go through joint or dental bone replacements. In the current study, we examine the addition of magnesium mineral deposits (Mg+) on biodegradable ceramic polymer nano-hydroxyapatite (HA)/ pol(L-lactic acid) (PLLA) scaffolds. Osteoblast

growth on the novel nano-HA/PLLA/Mg^+ scaffolds are being compared to growth on nano-HA/PLLA scaffolds to observe possible improvement in bone development. The objectives of this study are to determine and compare the proliferation rate and differentiation proficiency of osteoblast cells between scaffolds. Currently, cell proliferation (doubling time) is being compared utilizing a 3-(4,5-Dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) assay. MTT assays determine the amount of viable cells in a given sample by quantifying cellular mitochondrial dehydrogenase activity. Bicinchoninic acid protein assays will be utilized to measure the amount of collagen made by differentiated osteoblast cells. Analyzing the amount of collagen will determine if the incorporation of magnesium enhanced the health and functionality of osteoblasts on the scaffolds. Results have shown that both nano-HA/PLLA scaffolds and Mg^+ incorporated nano-HA/PLLA scaffolds are biocompatible and osteoconductive to osteoblast cells *in vitro*. Initial MTT experiments have shown that an increase in osteoblast cell growth has occurred in the scaffolds containing magnesium. So far, we conclude that the addition of magnesium to the scaffolds has increased osteoblast proliferation. However, further testing will be required to assess the overall consequence of magnesium addition to nano-HA/PLLA scaffolds.

Migration Reduces Parasite Prevalence in Monarch Butterflies

Rachel M. Rarick
Dr. Sonia Altizer, Institute of Ecology, University of Georgia

The protozoan parasite *Ophyrocystis elektroscirrha* commonly infects monarch butterflies (*Danaus plexippus*) and causes reduced longevity and flight ability of their hosts. Monarchs occur worldwide in non-migrating populations but are best known for the population in eastern North America that migrates annually to overwinter in Mexico. Parasite prevalence is lower in migratory versus non-migratory populations. One reason for this could be that harsher conditions in migratory populations – including the strenuous migration itself – reduce the number of infected individuals. To test this prediction, we compared infection rates of successfully migrated monarchs in Mexico with those caught in Georgia and Florida en route to their overwintering sites. We also compared monarchs at two different overwintering sites in Mexico, one of which (Sierra Chincua) has harsher microclimatic conditions than the other (Cerro Pelon). To determine infection status, we pressed pieces of clear tape on monarchs' abdomens and counted parasites on these using a microscope. At the overwintering sites we also measured butterfly forewing length, wing damage and abdominal fat. We found that infection rates of monarchs wintering in Mexico were lower than among monarchs caught during their migration. Also, monarchs at Sierra Chincua had lower fat reserves and higher infection rates than those at Cerro Pelon. These results support the hypothesis that harsher conditions and the migration process itself can reduce parasite prevalence in migratory populations. Monarch migration is currently threatened by human activities; our results have implications for understanding how this could alter parasite prevalence.

Towards a More Effective Delivery System for Anti-cancer Drugs

Mandy Redden – CURO SUMMER RESEARCH FELLOW
Dr. Robert Arnold, Department of Pharmaceutical & Biomedical Sciences, University of Georgia

Sterically-stabilized liposomes (SSLs) have been used to encapsulate camptothecins (e.g. topotecan). These potent anticancer agents have a broad spectrum of activity, but their clinical utility is limited by poor aqueous solubility, reversible pH-dependent metabolism, and rapid release, which limits tumor exposure to the drug. Encapsulating the inactive, water-soluble form of topotecan in SSLs is hypothesized to maximize drug retention and produce a sustained release at tumor and/or metastatic sites

of disease, while minimizing toxicity. Small (90 nm) liposomes with a composition of DSPC, cholesterol and PEG-DSPE in a 9:5:1 mole ratio were prepared, and their performance, drug stability and release in different buffering systems over time were determined. Lipid composition was determined spectrophotometrically using a modified inorganic phosphorus assay, and topotecan content was determined using a spectrophotometric microplate reader at an absorbance of 384nm. Preparation of SSLs in 5.4 pH buffered ammonium sulfate (250 mM) with basic topotecan loaded at drug:lipid ratio of .25 achieved an 87% loading efficiency, while SSLs in 7.4 pH buffered solution with acidic topotecan loaded at a drug:lipid ratio of 0.25 resulted in a loading efficiency of 81%. Both SSLs showed fairly stable lipid compositions after dialysis over a 102 hour time period at 20°C with gradually decreasing concentrations of drug. These data suggest that SSLs can be used to efficiently encapsulate and slowly release drug over time. Further examination under *ex vivo* conditions are ongoing and will be used to support future in vivo studies with the goal of improving treatment of prostate and breast cancer while limiting drug toxicity.

Development and Evaluation of a Coping Skills Training Program for Adolescents with Inflammatory Bowel Disease (IBD)

Eva Bonney Reed – CURO SUMMER RESEARCH FELLOW, CURO SCHOLAR
Dr. Ronald Blount, Department of Psychology, University of Georgia

The current study is a skills-based, psychological intervention for adolescent girls and their families aimed at reducing the pain associated with Inflammatory Bowel Disease (IBD) and at increasing quality of life. Inflammatory bowel disease refers to Ulcerative Colitis and Crohn's Disease, chronic gastrointestinal diseases. In general, studies investigating the psychological health of children and adolescents with IBD have shown that they demonstrate higher levels of psychological problems than do healthy controls (Engstrom, 1992; Engstrom & Lindquist, 1991; Mackner, Sisson, & Crandall, 2004). To decrease negative symptoms and improve daily functioning, skills such as problem solving, pain management, communication, and relaxation will be taught in the one-day program. Following the intervention, all participants will complete a web component to reinforce the skills learned in session. The first intervention is scheduled for winter 2007, and the paired wait-list control group intervention will take place six weeks following. All participants in the intervention (N=32) will be recruited from Children's Center for Digestive Healthcare in Atlanta, Georgia. Participating families will answer psychological questionnaires before and after the intervention program including the web component, and six months following the intervention to assess changes. We predict that the adolescents will report a reduction in abdominal pain, functional disability, and also in symptoms of depression and anxiety. Further, we expect parents to report a reduction in their daughters' abdominal pain, functional disability, and other somatic symptoms. Data will be assessed using both within group (pre-, post-, and follow-up for all subjects) as well as between group (treatment vs. wait-list control) analyses.

Conversations with God
Patricia Lynn Rhudy
Prof. Ted Saupe and Prof. Sun Koo Yuh,
Department of Ceramics, University of Georgia

I make small figures out of clay. When I start working on a piece, I only have a very rough concept about what it is going to look like or even what emotion I choose to evoke. I work quickly and responsively with the figures, using my eyes and then my mind. If I like the placement of an arm, a leg, or the tilt of a neck, I keep it. If I do not, I change it. I make art that I relate to. If I like it, if it somehow speaks about something real inside of me, then maybe someone else can relate to it as well.

Ceramic
2006

Determining the Affinity of Perchlorate for Albumin in Rat Serum Using Equilibrium Dialysis and Ion Chromatography
Lisa Rivard – CURO SUMMER RESEARCH FELLOW
Dr. Jeffrey Fisher and Dr. Jerry Campbell,
Department of Environmental Health Science,
University of Georgia

Perchlorate (ClO_4-) is a prospective health concern and is currently listed on EPA's Contaminant Candidate List. Upon ingestion from drinking water and other sources, ClO_4- enters the bloodstream, inhibits iodide uptake in the thyroid gland, and in turn decreases the body's ability to produce the thyroid hormones T3 and T4. This study was performed to determine the binding affinity of ClO_4- to serum proteins and to determine if iodide is a competitive inhibitor in this process. Laboratory conditions were developed to simulate body conditions. An equilibrium dialysis system was set up by loading 10 Teflon® cells. Each cell had a semipermeable membrane to separate rat serum from saline spiked with ClO_4- in concentrations from 195 to 100,000 ng/ml. The cells were rotated in a 37°C water bath for four hours to equilibrate and allow ClO_4- to bind to serum proteins. The cells' contents were removed via syringe and then further prepared for ion chromatograph analysis. The equation $C_{bound} + C_{free} = C_{total}$ was used to determine the amount of ClO_4- bound to serum proteins, where C represents concentration of ClO_4-. An overall trend of approximately 11.0-24.0% of ClO_4- was bound to serum proteins. When the experiment was repeated with the addition of 6250 ng/ml iodide to the saline solution, the approximate percentages of ClO_4- bound did not change. These data suggest that ClO_4- binds to serum proteins at approximately 11.0-24.0% of its total concentration and that iodide is not a competitive inhibitor in this process at iodide levels of 6250 ng/ml. Perchlorate travels to the thyroid gland, these data suggesting probably by means of nonspecific attachment to serum proteins, and can decrease the body's production of T3 and T4. The length of time ClO_4- remains bound to serum proteins and is thus able to remain in the bloodstream and reach the thyroid is left to be determined; a future study would be applicable in this area.

Applying Koch's Postulates of *Mycobacterium shottsii* Infections in Fish
Rebecca L. Satterfield
Dr. Frederick Quinn and Dr. Russell Karls,
Department of Infectious Diseases, University of Georgia

Striped bass (*Morone saxatilis*) from the Chesapeake Bay experienced an epizootic outbreak of mycobacteria beginning in the year 2000. A newly-identified bacterial species *Mycobacterium shottsii* was detected in a large

percentage of the diseased fish. The infected fish exhibited ulcerative lesions on the skin and granulomas in the kidney and spleen. In this case, Koch's postulates require that a pure culture of the bacterial agent can cause the granulomatous lesions and skin ulcers in experimentally infected fish and that the organism can be re-isolated. The goal of this project is to demonstrate Koch's postulates with *M. shottsii* using zebrafish as a model system. Thus, our hypothesis is that *M. shottsii* will infect zebrafish and produce lesions similar to those detected in infected striped bass. In this study, either *M. shottsii* bacteria or sterile saline was injected into the coelomic cavity of individual zebrafish. Both groups of fish were monitored for 25 days after which pathological analyses of euthanized fish revealed the presence of granulomas in the kidneys and liver of only the *M. shottsii*-infected group. Thus the first half of Koch's postulates has been completed. Re-isolation and culture of *M. shottsii* is ongoing due to the extremely slow growth rate of this bacterium and an abundance of faster growing commensal bacteria in the zebrafish. Long term infection experiments are in progress to demonstrate ulcer formation.

North Korea: Options for Dealing with a Nuclear Armed State

Aaron M. Sayama – ROOSEVELT @ UGA
Dr. Stephen Shellman, Department of International Affairs, University of Georgia

North Korea's recent nuclear test is an unsettling and worrisome act of aggression to global security and to the nuclear nonproliferation status of nations around the world. The perceived regional threat accompanying North Korea's declaration of nuclear capability could serve as a catalyst for a dangerous game of East Asian nuclear armament. Convincing North Korea to surrender its nuclear weapons program should be a top strategic priority for the United States. However, current US policy would have the world drive North Korea into further isolation. By pushing North Korea further out of global politics it will only exacerbate the problem. This paper will explore the proposed options for dealing with the North Korean nuclear crisis, assessing the advantages and disadvantages of each solution. A comprehensive, multilateral incentives package aimed at bringing North Korea out of its deep isolation is the most efficient and direct way of handling the issue of nuclear engagement. Such a package, negotiated in talks led by China, should include increased economic support from Japan, agricultural reform through South Korea, and a new and updated agreed framework previously laid out by the Clinton administration. This new agreed framework and multilateral action by neighbors to North Korea would provide the best basis for nuclear disarmament.

Femininity as a Continuum: From Battered Victim, to Self-Defense Aggressor, to Lesbian and to Barbarian

Kathryn L. Scheffel – CURO SCHOLAR
Dr. Dean Rojek, Department of Sociology, University of Georgia

It has been estimated that 1 in 10 persons arrested for murder is a woman, 1 in 50 death sentences imposed at the trial level is for a woman, 1 in 70 death row inmates is a woman, and 1 in 97 persons executed in the current era is a woman (Streib 2006). Due to this disproportionate representation, it is believed that there is a discriminating factor that greatly influences female murder trials more than the details of their crime. A contention has been made that a woman's degree of femininity is the ultimate deciding factor in determining the type of charges brought against her and, most often, the verdict of her criminal trial. This study will examine the implications of the degrees of femininity which are exemplified by the distinct types of women currently found within the criminal justice system: women who claim Battered Woman's Syndrome as a self-defense plea, women who defend themselves against their abusers, lesbians involved in capital cases, and women whose offenses aid in their categorization as being part of The Evil Woman Theory. Inherently these offenders share the same gender, but how their gender is portrayed

during their trial is disparate of one another. The issue of femininity is not only a case of discrimination against homosexual women, but also evidence of gender inequity occurring within the criminal justice system. Understanding the factors that influence a female offender's trial aids in arguing that the process for determining which offender receives a death penalty sentence is arbitrary and capricious.

Identifying the Source of an Introduction of Yellowfin Shiner
Clare H. Scott
Dr John Wares, Department of Genetics, University of Georgia

The introduction of a species into an environment where it is not native can have profound effects on that habitat such as a loss of native species and changes in the habitat where the organism was introduced. These events can also have a profound effect on the evolution of the introduced species, depending on the source and size of the introduction. Often determining the source of the introduction can be difficult due to the large native range of the species and the amount of time that has elapsed since the introduction. However, the Yellowfin shiner has recently been introduced to the Little Tennessee River (fewer than 10 generations ago). Also its range (with populations in the Chattahoochee and Altamaha basins in Georgia, and the Savannah, Broad, and Santee basins in South Carolina) is contained within the southeast US in close proximity to Athens, GA. Given these factors this study will be attempting to identify the source of the introduction and the initial size of the introduced group using genetic markers. I amplified mitochondrial and nuclear DNA gene regions, along with microsatellite markers, from each native population of Yellowfin shiner. These markers represent different portions of the genome and undergo different forms of selection and inheritance, which makes them useful in identifying the source population. By identifying the source it will be possible to observe the rate of evolution of a species that is adapting to a new habitat. Our results will also provide information about the dynamics of species introductions that can be used to manage other freshwater introductions.

Unsuspecting Targets – Preparing America's College Towns for a Bioterrorism Attack
Deep J. Shah – ROOSEVELT @ UGA
Dr. Loch Johnson, Department of International Affairs, University of Georgia

Review of biosecurity literature, analysis of federal documents, and original interviews with public health leaders reveals that football stadiums in small to medium-sized college towns, often distant from hub cities, are among the ideal targets for bioterrorism attacks. Such an attack could have devastating consequences similar to those following Hurricane Katrina. This paper assesses Athens, Georgia, using it as an example for comparable communities across the nation. Based on statistical data from the United States Department of Health and Human Services, Athens-Clarke County (ACC) regularly lacks adequate medical resources and personnel. Following a game day "BioKatrina" attack, the United States Department of Homeland Security estimates that 70 percent of stadium-goers will need medical treatment – 64,922 for Sanford Stadium. Such a strike would drastically overwhelm ACC's healthcare resources. In the event a contagious or extremely virulent bioweapon is used, it will be incumbent upon ACC leaders to contain and facilitate treating every potential victim. Moreover, physicians nationwide are unprepared to diagnose and treat bioterrorism victims without additional training. In order to expedite the clinical management of a stadium attack, Athens' leaders must do more than rely on mutual aid agreements. Printing evacuation routes on ticket stubs and fortifying potential treatment will create more organization within the healthcare response. Furthermore, every ACC official should be familiarized with the biological agent used, likely smallpox or anthrax, and its required treatment through Continuing Medical Education (CME) programs and other required educational curricula. The federal government should fund committees in

all communities like Athens to develop tailored curricula for these sessions. Enacting these measures will tremendously increase confidence and response capability at both the site of disaster and treatment facilities.

Construction of Plasmids for Deletion of the Polyphosphate Kinase Gene in *Mycobacterium tuberculosis*

Neel N. Shah
Dr. Russell Karls, Department of Infectious Diseases, University of Georgia

The causative agent of tuberculosis, *Mycobacterium tuberculosis*, exists in the latent phase in over one-third of the world's population. Annually, 8-10 million people suffer from the active disease leading to 2-3 million deaths. *In vitro*, *M. tuberculosis* can enter an antibiotic-resistant state of dormancy. Individuals cured of active TB disease typically remain latently infected and carry a 10% lifetime risk of reactivation of TB. Although the source of energy that this pathogen uses to emerge from latency is unknown, polyphosphates (polymers of high energy phosphate units) may be the source. To investigate whether polyphosphates participate in *M. tuberculosis* dormancy, we are constructing plasmid-based systems that will facilitate deletion of the *ppk* gene encoding polyphosphate kinase in this pathogen. Approximately 500 bp of chromosomal DNA on each side of *ppk* were obtained by PCR and cloned adjacently onto an *E. coli* plasmid to create a deletion cassette. These 500 bp flanking regions are required to direct homologous recombination/deletion of the *ppk* gene upon introduction of the recombinant plasmid into *M. tuberculosis*. Various derivatives of the deletion cassette plasmid have been created to help overcome the low homologous recombination frequency. Progress toward the construction of these plasmids will be presented along with a model for how these plasmids can be used to delete the *ppk* gene in *M. tuberculosis*.

Development of Leptin Resistance through High-fructose Diet

Christopher S. Sharp
Dr. Ruth Harris, Department of Food & Nutrition, University of Georgia

Over 60% of the American adult population is overweight or obese, with obesity becoming a critical health problem. Some studies have demonstrated a possible link between the consumption of high fructose corn syrup and obesity. Between 1970 and 1990 the consumption of corn syrup increased 1000%. The hormone leptin has been shown to inhibit food intake and increase energy expenditure in rodents and humans resulting in weight loss. It accomplishes this inhibition by signaling the hypothalamus, an area of the brain involved in food intake regulation, to change the expression of peptides known to regulate food intake and energy expenditure. Leptin must cross the blood-brain barrier to enter the hypothalamus; however, this transport can be inhibited by high concentrations of triglycerides in the blood. Studies have shown that diets high in fructose raise triglyceride concentrations; therefore we tested whether a high fructose diet could inhibit leptin function in rodents. In this study Sprague Dawley rats were fed either a 60% kcal high fructose diet or a control fructose free diet. After three weeks post-prandial serum triglycerides were approximately 175% those of the controls. The rats were infused with 60 μg/day rat leptin for two weeks. Leptin decreased body fat in the control rats but not those fed the high fructose diet. This experiment shows that high fructose diets impair leptin function, suggesting that the increase in consumption of high fructose corn syrup can potentially cause leptin resistance by raising serum triglycerides and thus may contribute to development of obesity.

Short-term Storage of MDBK Cells

Karin K. Sheehan
Dr. Jeremiah Saliki, Athens Diagnostic Laboratory, University of Georgia

Research involving the use of mammalian cell lines faces the difficulty of storing and preparing

cell cultures for experiments. Cell lines can be stored indefinitely in liquid nitrogen (-197°C), but must be properly thawed, grown, and trypsinized before use for research and diagnostic tests. The need for fresh cells results in high costs that would be reduced if cell suspensions could be stored over a period of days and remain viable for tests. For this study, Madin Darby Bovine Kidney cells (MDBKs) were stored for up to eight days in refrigerator temperature to determine if they maintained their sensitivity to bovine viral diarrhea virus (BVDV) infection. Twenty-four flasks of MDBKs were trypsinized and the cell suspension from each flask divided into nine aliquots. The aliquots were stored at 4°C, and one set of 24 suspensions was used each day for cell counting, titration of BVDV, and the serum neutralization test. Over the nine days (0 to 8), there were significant differences between cell counts but not virus titers or antibody titers. Days 0 and 1 had higher counts than Days 5-8, and Day 2 had a higher count than Days 6-8, with a statistical level of significance of 0.05. These findings suggest that MDBK cell suspensions can be stored at 4°C for a period of nine days and maintain their sensitivity to BVDV infection. These conditions are easy to maintain in a laboratory and can increase efficiency of maintaining cell lines by decreasing the costs of storage.

The Interaction between Culture, Poverty, and Educational Achievement: How Policy Can Better Impact the Graduation Rates of Georgia's Latino and African American Youth

Nari Shin, Celina Correa & Yuliya Kuzovkova – ROOSEVELT @ UGA
Dr. Larry Nackerud, School of Social Work, University of Georgia

The population of Georgia consists of various cultures, economic standings, and education levels. Research and statistical data show Latinos and African Americans in the state of Georgia consistently with a lower high school graduation rate. Georgia's Latino and African American populations have poverty rates that are higher compared to Caucasians. The factors of cultural background and economic standings are significant contributing variables. Decreased earnings are one of the important negative results on the adult lives for these youth groups. Analysis of data accessed from Emory University, the U.S. Census Bureau, and the Georgia Department of Education reveals the positive and powerful correlation between educational progression and economic standing among Latinos and African Americans. The purpose of this paper is to help understand the interaction of the complex variables of culture and economic standing affecting Latino and African American youths' educational progression. In order to combat this issue, various policies after investigation show positive results, such as the membership in the MSAN, the Minority Student Achievement Network, as well as Charter school options, and governmental aide through certain welfare programs. Another effective economic policy is the "Robin Hood Act" used in Texas to distribute equal state and local funds to school districts. Also, an increase in the federal budget for the study of national dropout rates will develop even more effective policies. These policies will help the development and execution of effective educational policies to decrease dropout rates for the Latino and African American students in the state of Georgia.

Determining Appropriate Social Assistance Models for Children Living in Communities Affected by HIV/AIDS in Sub-Saharan Africa

Helen C. Smith
Dr. Christopher Allen, Department of International Affairs, University of Georgia

The HIV/AIDS epidemic is particularly harsh in sub-Saharan Africa, where approximately 25.4 percent of people are infected with the virus. Children are often the most affected by the epidemic, frequently losing family members and access to resources early on. Appropriate policy responses to protect children from the shocks of HIV/AIDS have developed slowly, but the epidemic's scale requires comprehensive

solutions to strengthen communities and prevent new infections. A fundamental question is how resources should be disbursed in order to build the capacity and capital of households and communities in order to benefit vulnerable children. Currently, however, there are no comparative studies of social protection models that focus on children in communities affected by HIV/AIDS. This paper addresses some of these gaps through comparing targeted but unconditional payments, targeted and conditional transfers, cash for work programs and in-kind transfers. Case studies in South Africa were analyzed to see how well each performs as a family- and community-centered approach that is universal in its treatment of children, has long-term development potential, can be sustained by the government, and does minimal harm with regards to established community safety nets. The paper found that unconditional cash transfer payments offer the most potential, but more robust evaluation of current programs is needed.

The CO-H2 Variation in Translucent Clouds at Small Scales

Myra J. Stone
Dr. Loris Magnani, Department of Physics & Astronomy, University of Georgia

It is important to study interstellar molecular clouds, the sites of all galactic star formation, in order to understand the evolution of our galaxy. Because most of our knowledge of molecular clouds is tied to a determination of their mass, it is of fundamental importance to develop methods which lead to accurate mass estimates. One method is to calibrate the CO – H2 conversion factor known as X(CO). X(CO) is defined as the molecular hydrogen column density divided by the CO(1-0) velocity-integrated antenna temperature. There is a relationship between the integrated antenna temperature of CH and the amount of molecular hydrogen in a cloud which, in turn, can yield X(CO). It is via this CH-H2 relationship that we have re-examined the three interstellar molecular clouds MBM03, MBM16, and MBM40 in order to calculate how X(CO) varies over the clouds on scales of two arcminutes. Previous analyses measured changes on scales of nine arcminutes, so our objective is to explore variations in X(CO) at smaller scales. We present the analysis of new data taken at the Arecibo radiotelescope of MBM40, MBM16, and MBM03.

Characterization of the *vgat* Expression Pattern in the Developing Mouse Brain

Ryan J. Summers, CURO SCHOLAR
Dr. Brian Condie, Department of Genetics, University of Georgia

GABA (γ-aminobutyric acid) is the primary inhibitory neurotransmitter in the mammalian nervous system. The vesicular GABA transporter (VGAT or VIAAT) is a key component in the release of GABA as a neurotransmitter in the mammalian nervous system. It is responsible for loading GABA into synaptic vesicles for release at the neuronal synapse. Until now, the expression pattern of the *vgat* gene in the developing mouse brain had not been characterized. In order to address this question mouse brains at incremental stages from embryonic day 14.5 to embryonic day 17.5 were examined for *vgat* expression. This procedure was accomplished using a mouse line containing an insertion of the *lacZ* reporter gene into the *vgat* coding sequence. Visualization of the reporter gene expression has enabled characterization of the expression pattern of *vgat* in the mouse brain over the course of development. The results obtained indicate that *vgat* is expressed in regions previously identified as containing GABAergic neurons, including the striatum, ganglionic eminence, and cortex. These data indicate that *vgat* is a marker for GABAergic neurons. This characterization of the *vgat* expression pattern over the course of development has expanded our knowledge of the GABA neurotransmitter pathway. The data obtained shows where GABAergic neurons are located spatially as well as what neural circuits they are interacting with at different developmental stages; this information is crucial to understanding the role of GABAergic neurons in brain development.

Calcium-independent Phospholipase A_2 Are Novel Targets for Inhibition of Prostate Cancer Cell Growth

Sonia Talathi – CURO APPRENTICE & CURO SUMMER RESEARCH FELLOW
Dr. Brian S. Cummings, Department of Pharmaceutical & Biomedical Sciences, University of Georgia

Current treatments for prostate cancer include cisplatin and vincristine. Although these chemotherapeutics are somewhat effective, current strategies have focused on combinatorial dosing. This study tested the ability of the Ca2+-independent phospholipase A2 (iPLA2) inhibitor bromonenol lactone (BEL) to alter cell growth and death of human prostate cancer cell cultures (PC-3) in combination with commonly used chemotherapeutics cisplatin (0-50 μM) and vincristine (0-2 μM). Exposure of PC-3 cells to cisplatin for 48 hours resulted in concentration-dependent decreases in growth with an IC50 of 25 μM. Exposure of cells to BEL prior to cisplatin treatment lowered the IC50 to 6.25 μM. Similar results were seen for vincristine. These data suggested that treatment of cells with BEL potentiated the ability of cisplatin and vincristine to decrease cell growth. To study the mechanisms involve in this process, the effect of BEL, in the presence and absence of chemotherapeutics, on cell cycle and annexin and PI binding was studied. Exposure of cells to BEL increased the amount of cells in G1 while decreasing the amount of cells in S-Phase. Incubation with cisplatin or vincristine induced a G2-M arrest. However, pretreatment with BEL inhibited this arrest and increased the amount of cells in G1 and sub-G1. These data suggest that iPLA2 inhibition decreases cell growth by decreasing the progression of cells from the G1 to the S-phase of the cell cycle, that the effect of iPLA2 inhibitors and chemotherapeutics on cancer cell growth are additive, and that iPLA2 is a novel target for the inhibition of cancer cell growth.

Gene Expression Profiles of Neuronal Cells Derived from Human Embryonic Stem Cells

Christine E. Tarleton – CURO APPRENTICE
Dr. Steven Stice, Department of Animal & Dairy Science, University of Georgia

Human embryonic stem (hES) cells are a potential source for generating large quantities of neuronal cells for use in cell therapy treatments for neurodegenerative diseases such as Parkinson's. A major goal in stem cell research is to fully understand and to reliably and specifically differentiate hES cells into the specific subtypes of neuronal cells. Our lab has derived an intermediate between hES cells and neuronal cells, the neuronal progenitor (NP) cell. NP cells have the ability to become several types of neuronal cells such as neurons, astrocytes, and oligodendrocytes. Although it is currently possible to differentiate neuronal cells from NP cells, this process is not fully understood in part because these cells have not been fully characterized. By isolating mRNA from the cells at different stages of differentiation (hES cells, NP cells, and neuronal cells) and using a low density array to perform simultaneous real-time PCR reactions of 95 genes known to play a role in neuronal development, it may be possible to determine which genes are expressed at each stage of the differentiation process as well as their relative quantification at these stages. Relative quantification will be determined by comparing the expression of the genes known to play a role in neuronal development to a housekeeping gene, a gene that is transcribed at a relatively constant level regardless of experimental conditions. It is our hope that these gene expression profiles will provide insight into the differentiation of hES cells into various neuronal cell types. We expect the derived NP cells to have similar gene expression profiles to neuronal epithelial cells; likewise, we believe that the derived neuronal cells' gene expression profile will be consistent with that of neurons.

Peyton Wall's Impact on Racial Relations in 1960s Atlanta, Georgia

Courtney M. Thomas – CURO APPRENTICE
Dr. Barbara McCaskill, Department of English, University of Georgia

In the 1960s, the city of Atlanta, Georgia was a booming metropolis that constantly added new businesses and residents. Americans considered Atlanta "The City too Busy to Hate," since many of the city's public and private areas were desegregated. However, much racial segregation existed among residential areas. One such neighborhood was Peyton Forest, an all-white subdivision located in southwest Atlanta. In the fall of 1962, the subdivision's developer grew dissatisfied with the rate of development and threatened to start selling homes in Peyton Forest to African Americans, since many blacks were currently moving into adjoining neighborhoods. Enraged by his threat, the white homeowners of Peyton Forest formed the Southwest Citizens Association, whose purpose was to maintain the neighborhood's racial homogeneity. Ivan Allen, Atlanta's mayor at the time, decided to stop the panic of these white homeowners by designating an area of unused commercial land to the north of Peyton Forest as a place to house low-to-middle income African Americans. On December 17, 1962, Mayor Allen further met the desires of Peyton Forest's white homeowners when he signed a proposal to build a 2-foot, 10-inch-high, steel and wood barrier that separated Peyton Forest from Collier Heights, a middle-class African American neighborhood. My presentation focuses on Peyton Wall's impact on Atlanta's reputation as a racially progressive city during the 1960s. I will also discuss how Peyton Wall and other racial buffers led to "white flight" in the city and the racial disparities between metro and suburban Atlanta that currently exist.

A Study of Site Formation Processes for the Northwestern Hawaiian Islands

Lindsey Thomas, CURO SCHOLAR
Dr. Ervan Garrison, Department of Anthropology, University of Georgia

The Northwestern Hawaiian Islands is the most remote archipelago of distant atolls in the world. Despite their small size, these islands have harbored shipwrecks for hundreds of years. Site formation process is the study of how a ship goes from being a highly organized machine whose purpose is to stay afloat to a scatter of artifacts on the bottom of the ocean. Every environment and type of ship undergoes a different site formation process. Site formation process is crucial to understanding the archaeological site, and can help archaeologists determine the path that a ship took as it wrecked. This is an ongoing study aimed at determining the unique characteristics of a wooden shipwreck in the Northwestern Hawaiian Islands. This paper is based on fieldwork conducted during a 2006 NOAA Hollings Program scholarship and research conducted through University of Georgia CURO Independent Research courses. The scholarship allowed the author to join the annual field research cruise to the Northwestern Hawaiian Islands on board the NOAA ship *Hi'ialakai.* To develop/apply a site formation theory to any particular region, it is necessary to use information about both the environmental conditions of the area and information about shipwrecks themselves. Information about environmental conditions in the Northwestern Hawaiian Islands was obtained from oceanographers that study the region, and the historical information about four shipwrecks (the *Pearl*, the *Parker*, and the USS *Saginaw,* and an unidentified fishing vessel) was obtained through fieldwork conducted by the author. Each site was mapped in as much detail as possible, and by combining this information with historical details about the shipwrecks and information about the environment, it was possible to gain a better understanding of site formation processes for wooden shipwrecks in the Northwestern Hawaiian Islands.

The Caddo Bateau

Lindsey Thomas, CURO SCHOLAR
Prof. R. G. Brown, Departments of Sculpture and Studio Foundations, University of Georgia

I am not an artist in the traditional sense. I study Maritime Archaeology, which could be considered a different type of art. The construction of the Caddo Bateau, a flat bottom fishing boat from Lake Caddo in Texas, was built so that I could gain a better understanding of small boat construction. This process will help me analyze future archaeological sites with a better understanding of the subject matter. The Caddo Bateau that is currently under construction will likely be built of cypress and mulberry, though that is dependent upon the availability of materials. The first step in constructing the boat was to draw the plans. Those plans were then converted into a scale model. The fifteen-foot boat was shrunk down to a thirty-inch cypress model. This model was built as a way to prepare for the construction of the larger boat and to work out any issues with the directions in advance. The Caddo Bateau was chosen as the type of boat to be built because it was small enough and simple enough to be feasible for a first-time boat builder to complete, while still offering several characteristics found in larger boats, such as plank construction and supporting knees. Ideally, by the end of construction I will be able to analyze shipwreck sites with a builder's eye rather than just a student's.

The Analysis of Synthetic Neoglycolipids by FTICR Tandem Mass Spectrometry

Laura A. Thornsberry
Dr. Jon Amster, Department of Chemistry, University of Georgia

Synthetic neoglycolipids are used as stabilizing agents in cationic liposomes, which are one of the most important nonviral gene carriers used in cancer gene therapy. A series of synthetic neoglycolipids, consisting of a sugar linked to a steroid by a polyethylene glycol (PEG) chain, were analyzed using Fourier Transform Ion Cyclotron Resonance mass spectrometry. Recently, synthetic neoglycolipids were observed to form a unique product ion, called the [C-glycoside]+, as the result of the excision of the PEG chain from the molecule. The purpose of this work is to confirm the structure of this novel product by tandem mass spectrometry, as well as study the conditions in which it is formed. Mass spectra of the samples were acquired in positive and negative ion modes, and collisionally assisted dissociation and infrared multiphoton dissociation were used to further fragment the ions. Initial fragmentation of the protonated species of the synthetic neoglycolipid samples resulted in the formation of the [C-glycoside]+ product ion. Further fragmentation of the [C-glycoside]+ ¬resulted in two peaks, which were assigned as the sugar and the steroid, thereby confirming the *in situ* formation of this ion-molecule product. In many cases, substantial amounts of formic acid were used to strengthen the intensity of the [M+H]+ peak. Some neoglycolipids were only observed as [M+Na]+, due to their inherent acidity, and did not form the [C-glycoside]+ product. The samples were also studied under negative ion mode, however, the novel product

did not occur under these conditions. The presence of acetylated groups on the sugar moiety of the molecule also proved unsuccessful in the generation of the novel product ion.

Glycosyl Composition Analysis of *Rhizobium leguminosarum* 3841 Bacteroids

Prince Tieku
Dr. Russell Carlson, Department of Biochemistry & Molecular Biology , University of Georgia

The legume-nodulating bacterium, *Rhizobium leguminosarum*, forms symbiosis with leguminous plants while other bacteria can not co-exist with these plants. Once inside the root cortical cells, the bacteria's surface membrane differentiates morphologically and functionally yielding bacteroids; the active form of the bacteria which carry out nitrogen fixation. The aim of this project was to study the biochemistry of the bacteroid surface lipopolysaccharides. Pea plants were infected with the *Rhizobium* and the bacteroids were isolated. The bacteroid lipopolysaccharides (LPSs) were extracted by a phenol-water method, and analyzed by polyacrylamide gel electrophoresis in deoxycholate (DOC-PAGE). DOC-PAGE revealed that a majority of the bacteroid LPS was recovered in the phenol layer. In contrast, free-living forms of the bacteria yielded LPS that partition primarily into the water layer. The extracts were analyzed by preparing TMS-methyl glycoside and alditol acetate derivatives with GC-mass spectrometry analysis. The phenol layer extract contained unusual, endogenously methylated glycosyl residues, having a higher degree of methylation than those derived from free-living Rhizobial LPS. These results indicated that the bacteroid LPS are altered compared to LPS from the free-living *Rhizobia*, indicating a shift toward greater hydrophobicity for the bacteroid LPS. These changes may contribute to long term bacteroid survival within the plant cell. This project seeks to further understand the molecular basis of the many stages of symbiotic infection. This in turn can result in the development (through molecular biological construction) of improved strains of *Rhizobia* that can broaden their host-range specificity, increase their competitiveness, and thus maximize legume growth rates and yields.

Trade for Humanity: A Proposal for Viet Nam

Anh V. Trieu & Ashley Bowen – ROOSEVELT @ UGA
Dr. Maurits Van der Veen, Department of International Affairs, University of Georgia

Despite pressure from the United Nations and the constraints of international law, the Vietnamese government continues to deny its citizens basic political freedoms. Fundamental rights like freedom of speech, press, and religion are routinely restricted in Viet Nam, which blatantly violates the United Nations' Universal Declaration of Human Rights. The United States, Viet Nam's largest trade partner with 21.2 percent of Viet Nam's trade activity, normalized trade with Viet Nam in 2006. The United States is in a unique position to create incentives for the Vietnamese government to improve its substandard human rights record. The United States, using reports from international human rights organizations, should prepare a series of human rights goals that Viet Nam must implement. For each year that goals are met, the United States would decrease tariffs on imported goods from Viet Nam by a percent. Offering phased incentives, a continued decrease in tariffs for each year, the policy should produce measurable improvement in Vietnamese human rights without the stigma and backlash of applying direct pressure. The incentive system would penalize Viet Nam for human rights violations and reward good behavior with increased participation in the global market. This policy would further the United States' commitment to promoting democracy and freedom in southeast Asia.

Genetic Systems for the Elimination of Polyphosphate Synthesis in *Mycobacterium avium* Subspecies *paratuberculosis*
Blake M. Troiani, CURO SCHOLAR
Dr. Russell Karls and Dr. Frederick Quinn, Department of Infectious Diseases, University of Georgia

Mycobacterium avium subspecies *paratuberculosis* (*M.a.p.*), a slow-growing pathogen of ruminants and the cause of Johne's disease, colonizes the distal ileum of the small intestines. As antimycobacterial treatment for *M.a.p.* infection is not feasible, a live-attenuated vaccine strain of *M.a.p.* may provide a better solution to Johne's disease. The goal of this research is to explore a new avenue for the creation of a suitable vaccine strain of *M.a.p.* Previous research has implicated the polyphosphate kinase gene (*ppk*) as essential to the survival of *Salmonella enterica* in acidic environments. Because *M.a.p.* similarly endures typically lethal pH environments and contains a putative *ppk* region, it is hypothesized that *ppk* serves an equivalent purpose in *M.a.p.* A *ppk* deletion mutant will be created by homologous recombination. Regions adjacent to *ppk* on the *M.a.p.* chromosome will be amplified by polymerase chain reaction (PCR) and cloned adjoining one another on an *E. coli* plasmid. Genes necessary to facilitate the isolation and screening of deletion candidates will subsequently be incorporated into the plasmids. The newly created vectors will serve as a suicide delivery vector for facilitating the deletion of *ppk* in *M.a.p.* via homologous-recombination mediated replacement of *ppk*. If the mutation causes the expected effect, diminished growth should be observed in situations that mimic the low pH *M.a.p* would encounter in infection conditions.

An Affect Control Model of Attribution
Traci N. Tucker
Dr. Dawn Robinson, Department of Sociology, University of Georgia

Past research has suggested that attributions are made on the basis of perception; however, more recent research suggests that attributions are generated when a conclusion is inconsistent with an individual's expectation. This study aims to answer the question of what drives individuals to make different types of attributions and how those attributions can be predicted for in any given situation. Two experiments examined the relationship between attribution and deflection, where deflection is conceptually defined as how unlikely a particular occurrence is, to see if high deflection rates would predict situational attributions and vice versa. Study 1 made use of self report data to assess the attribution outcomes of high and low self-esteem individuals when they were presented with either positive or negative feedback themselves. Study 2 then used computer simulations to calculate the expected deflection for the events of study 1. Results indicated that high deflection rates do indeed lead to situational attributions while low deflection rates lead to dispositional attributions.

Parasite Strain-dependent Cariation in CD8+ T Cell Responses Is a General Characteristic of Experimental *Trypanosoma cruzi* Infection
Jake E. Turrentine, CURO SCHOLAR
Dr. Rick L. Tarleton, Department of Cellular Biology, University of Georgia

The genome of *Trypanosoma cruzi*, the causative agent of Chagas' disease, contains a large number of *trans*-sialidase (ts) genes that encode for peptides recognized by $CD8^+$ T cells in mice and humans. In previous studies, experimental infection of C57BL/6 mice yielded dominant $CD8^+$ T cell responses against ts peptides TSKB20 and TSKB18. However, the kinetics and magnitude of the ts-specific $CD8^+$ T cell responses varied depending on the infecting parasite strain. The studies presented here sought to determine whether parasite strain-dependent differences in ts-specific $CD8^+$ T cell responses are a general phenomenon of experimental infection. Therefore, Balb/c mice were infected with different strains of *T. cruzi* (Brazil, CL or Y strain), and $CD8^+$ T cell responses to the previously identified ts epitope TSKD14 were

examined. $CD8^+$ T cells from Brazil-infected mice produced the pro-inflammatory cytokine IFN-gamma at higher frequencies following TSKD14 stimulation than did $CD8^+$ T cells from mice infected with CL strain. However, TSKD14-specific $CD8^+$ T cell responses were observed earlier following CL infection than following Brazil infection. TSKD14-specific recall responses were considerably lower from splenocytes of Y strain-infected mice. *In vivo* cytotoxic activity against TSKD14-pulsed cells also varied in mice infected with different parasite strains. Thus, as predicted, the kinetics and magnitude of TSKD14-specific immune responses show parasite strain-dependent variation in Balb/c mice. These results suggest that infection of humans by different strains may lead to substantially different immune responses and could contribute to different disease outcomes.

The Role of CD8+ T Cell Responses to Immunodominant Trans-sialidase Epitopes in Control of Experimental *Trypanosoma cruzi* Infection

Jake E. Turrentine, CURO SCHOLAR
Dr. Rick L. Tarleton, Department of Cellular Biology, University of Georgia

Trypanosoma cruzi, the causative agent of Chagas' disease, afflicts approximately 18 million people in Central and South America. In both humans and mice, the $CD8^+$ T cell response is critical for management of *T. cruzi* infection. Depletion of $CD8^+$ T cells during infection leads to elevated parasitemia, and mice deficient in $CD8^+$ T cells are unable to control the infection. In *T. cruzi* infection of Balb/C mice, dominant $CD8^+$ T cell responses against a single *trans*-sialidase (ts)-derived peptide (TSKD14) have been identified. This study examines the role of TSKD14-specific $CD8^+$ T cell responses in the control of *T. cruzi* infection. To this end, mice vaccinated to induce potent TSKD14-specific $CD8^+$ T cell responses, or tolerized to prevent the induction of TSKD14-specific responses during infection, have been generated. These mice will be challenge infected with *T. cruzi*, and the ability to control the infection will be determined. We predict that vaccination to induce TSKD14-specific responses will protect mice from lethal infection and that tolerization of this response will make mice highly susceptible to challenge infection. The possibility that responses to alternative ts or non-ts epitopes may be able to compensate for the absence of the dominant $CD8^+$ T cell response against TSKD14 will also be investigated. Results from these experiments will reveal the importance of the ts-specific $CD8^+$ T cell response and will provide guidance for the formulation of vaccines for *T. cruzi* infection.

The Effect of Women as Candidates in Congressional Campaigns

Anna Tyler
Dr. Ruthann Lariscy, Department of Advertising & Public Relations, University of Georgia

Each election cycle, more women are elected into the US House and Senate. Women are also increasing their numbers in leadership roles within the political sphere and constantly expanding opportunities for future generations of women in politics. The fight to be elected to a national office is one that women of all ages, races and beliefs have struggled with for decades. Six races for the House of Representatives were examined during the 2006 Election Cycle in order to shed light on the dynamics of campaigns in relation to gender. The races were broken into three subgroups: two races featuring men only, two races featuring men and women, and two races in which just women ran. The data are drawn from a variety of local and national news publications from across the country as well as several previously conducted research studies on women and political campaigns. Previous studies suggest support for the idea that women who assume offensive positions in policy areas that are considered traditionally male receive increased support and higher approval ratings. However, gender was shown to have no real effect on negativity or attack ads during the campaigns. Rather, as more and more women enter politics at the national level, races are focusing less on gender and more on other aspects of the

candidate's life such as their party affiliation and previous political experience. This expansion of women into the political arena creates a new and exciting dynamic, especially as the playing fields appear to level and gender is taken out of the equation, by opening the door to more viewpoints and a variety of backgrounds and opinions.

Music and Identity among Mexican Immigrants in Atlanta, 1985-2006
Karen C. Usselman
Dr. Pamela Voekel, Department of History, University of Georgia

Mexican immigrants to the United States have used music to cope with the struggles of living in a new society, to maintain a connection with their homeland, and to create unified immigrant enclaves for as long as the border between the two countries has existed. But just as trends in immigration fluctuated, so too have the styles, content, and popularity of music in immigrant communities. Studying the changes in the music of Mexican immigrants reveals varying degrees of cultural mixing and assimilation, evolving economic and social struggles, attempts at establishing a cohesive immigrant community, and even the development of a new Mexican-American identity. The city of Atlanta, with its exploding Mexican immigrant population, vibrant musical tradition, and historically active minority population, provides a unique and relatively unstudied locale for exploring the effects of music on Mexican immigrant identities in a rapidly globalizing society. My three primary methods of conducting such research are to examine the styles and content of popular song lyrics from the late 1980's onward, to read the Atlanta newspaper Mundo Hispánico from the same period, and to interview music industry professionals in Atlanta, such as record store owners and radio station managers, about the evolution of Mexican music and changes in the listening audience. This approach reveals a multi-faceted and dynamic Mexican-American identity, rooted in a sense of shared history and developed through shared experiences, that reflects the changes of a globalizing culture.

Chicken Water*, *What Are We?*, and *We Are Nothing But the Scraps
Kacie Versaci
Prof. Judith Ortiz Cofer, Department of English, University of Georgia

I began writing as soon as I could form words on pages, transferring images from my brain to the paper. Time has brought me to the ripe old age of 20, where I have been finding many more outlets for my writing than just journals and private scribbling. In the spring of my sophomore year of college, my writing focused on poetry and prose-poetry, then shifted the fall of my junior year to more essays and creative non-fiction. I am at a phase now where I am experimenting with ruination, by blending other works into new poems and crossing genre lines to create new media. I am also working on a series of short, creative non-fiction pieces about various relationships in my life and experimenting with different forms of stream-of-consciousness fiction. I draw a great deal of influence from Judith Budnitz, trying to blend imaginative story telling with fresher takes on prose. My current area of study is magazine journalism, so more of my writing style is drawn from the writing skills learned in that field.

The Effectiveness of Teaching Expressive Arts Activities Based in the Methods of Art and Drama Therapy to Educators to Improve Student Welfare
Erika B. Vinson – CURO SUMMER RESEARCH FELLOW
Dr. Richard Siegesmund, Department of Art Education, University of Georgia

The purpose of this mixed-methods study is to determine the effectiveness of The ArtReach Foundation's Train the Trainers workshops in preparing teachers and community leaders to use art and drama therapy-based activities with their children to help them express themselves. Data were collected through surveys, interviews, follow-up interviews, and visual journals. The participants were Arkansas educators, counselors, and administrators, some of whom have received Gulf Coast evacuees in their

classrooms. Six school counselors, five art instructors, one preschool multicultural specialist, one social worker, one incarcerated-parent educator, and one school administrator completed two surveys. The first survey inquired about the participants' first experience in the five-day workshop in October of 2005 and how it has affected their work with children. The second survey pertained to the second phase of training conducted during a week in June 2006. Eleven counselors and teachers participated in thirty-minute semi-structured interviews. All participants were also provided a visual journal in which to document their personal reflections and reactions to the workshop curriculum by means of text and images (Grauer & Naths, 1998). Starting with the daily goals and objectives used by the ArtReach professionals to organize instruction, the data is thematically reviewed with a focus on discursive, metaphoric, and visual symbolic meaning in the participants' visual journals. Preliminary findings suggest that visual journals aid in sustaining and expanding important metaphors utilized during instruction, help to organize thoughts, and clarify points emphasized during instruction, and show complexity of thought leading to more robust understandings of the participant.

Initial Sequencing and Tissue Distribution of Toll-like Receptor 3 mRNA in White-tailed Deer

Seychelle M. Vos
Dr. Elizabeth Howerth, Department of Veterinary Pathology, University of Georgia

Hemorrhagic disease is a fatal disease in white-tailed deer (WTD) caused by two closely related double stranded RNA orbiviruses, bluetongue and epizootic hemorrhagic disease. Susceptibility to these viruses varies among populations of WTD, and results from experimental studies suggest that innate immunity may contribute to these differences. It is hypothesized that the Toll-like receptor 3 (TLR3), an important cell surface receptor in innate immunity that recognizes double stranded RNA (dsRNA), may be involved in differences in innate immunity in WTD populations. However, little is known about TLRs in WTD, and rudimentary information is needed before the potential effect of TLR3s on disease susceptibility can be evaluated. Therefore, the objectives of this study were to perform initial sequencing and determine tissue distribution of the mRNA of TLR3 in normal WTD. A 209bp portion of WTD TLR3 mRNA was sequenced using primers designed originally for the TLR3 in cattle. Primers were then designed specifically for deer using the newly sequenced fragment. A northern blot was performed to confirm that the sequenced mRNA fragment was the TLR3 receptor. Quantitative analysis of TLR3 mRNA in various WTD tissues from non-infected WTD was performed using real time-polymerase chain reaction (RT-PCR). The results suggest that the TLR3 is expressed in skin, small intestine, brain, lung, and spleen tissues at levels that may prove useful in future research. These initial results will allow further investigation into the overall significance of the TLR3 in variation of susceptibility to disease among WTD populations.

Identification of L-PHA Reactive Glycoproteins from Invasive Breast Carcinoma Tissue: Potential Biomarkers for Early Detection

Rachelle W. Wallace, CURO SCHOLAR
Dr. Michael Pierce, Department of Biochemistry & Molecular Biology, University of Georgia

There is an urgent need for the research and development of biomarkers for breast cancer to aid in diagnosis. The focus of this project is the use of new glycoproteomic techniques to discover biomarkers for breast cancer. Glycoproteomics will allow the identification of specific glycoproteins that have been reported to contain an identified carbohydrate structure attached to an asparagine residue on glycoproteins known as the β (1,6) N-linked glycan. The presence of this glycan is altered throughout the progression of breast carcinoma. Recent studies have found that the lectin L-PHA binds to and enriches for glycoproteins expressing the β (1,6) N-linked glycan, which is present on glycoproteins expressed in breast

carcinoma, but is absent in non-diseased tissue. The goal of this study was to detect the glycoproteins that contain the β (1,6) N-linked glycan in the tissue of patients with breast carcinoma. The binding of this lectin indicates the expression of the β (1,6) N-linked glycan. Analysis of the tissue was performed by means of lectin-affinity chromatography and liquid chromatography/mass spectrometry in order to identify glycoproteins or glycopeptides that show this specific β (1,6) N-linked glycan in breast carcinoma and to show the ability of this lectin L-PHA to enrich for these proteins. Several glycoproteins identified as a result of L-PHA enrichment have been previously linked to cancer in recent literature, specifically within the TGF-β signaling pathway. With further research, one of these identified proteins could potentially become a biomarker for breast cancer diagnosis.

The Price of Victory: Influences on the Conduct of War

Joshua J. Watkins – CURO SUMMER RESEARCH FELLOW, CURO SCHOLAR
Dr. Patricia Lynne Sullivan, Department of International Affairs, University of Georgia

The deployment of military forces abroad is one of the most difficult and profound decisions national leaders face because of the daunting task of determining the potential human and material costs of attaining a state's political objectives. But there have been no attempts to collect systematic data on leaders' pre-war expectations about the duration, casualty rates, or troop and resource requirements of military operations. In addition, extant literature does not explore the connection between leaders' pre-war expectations and public support for sustaining military operations once they are underway. I used military records, government documents, archival material, newspaper articles, secondary historical accounts, and chronologies of international events to collect data on both anticipated and actual troop deployments, conflict escalation, casualty rates, assistance from allies, and public support for sustaining British, French, and U.S. military interventions since World War II. My research suggests that leaders' pre-war expectations are often misguided and, in some cases, completely wrong. I also found that public support for sustaining military operations tends to decrease over the course of a conflict, although not as dramatically as previous case studies would cause one to believe. Levels of support vary according to the objectives of a military intervention, the human cost, and public perceptions of progress. This research provides insight regarding the ability of nations to bear the costs of future conflicts.

Sexual Orientation as a Diffuse Status Characteristic: The Effects of Sexual Orientation on Expectations in Interaction

Alexander W. Watts – CURO SCHOLAR
Dr. Dawn Robinson, Department of Sociology, University of Georgia

Status characteristics theory attempts to model how groups working together to complete a task act according to a shared hierarchy of expectations based on group members' expectations for each other's competency. This hierarchy is based on group members' characteristics that are both unrelated (diffuse status characteristics) and immediately related (specific status characteristics) to the task at hand. Despite the wealth of literature providing evidence for gender, age, and occupation operating as diffuse status characteristics, no experimental research has tested the operation of sexual orientation as a diffuse status characteristic, though the implications of discovering the effects of sexual orientation are profound. For example, what effect does the perception of a jury member's sexual orientation have on the rest of the jury's tendency to value his/her input? Would a heterosexual U.S. soldier be less likely to obey the commands of an openly gay officer? In this paper, I provide evidence for the need to empirically test the effects of sexual orientation on expectations in interaction through an experimental design. I find that survey data, past research, and theoretical reasoning illustrate that sexual orientation likely influences expectations in task settings. Furthermore, based on survey data and

the results of a computer simulation of affect control theory, I provide evidence that the effects of sexual orientation on the group's shared hierarchy of expectations are conditional upon the gender of the group members. Last, I will make more general conclusions about the real-world and theoretical implications of my findings and suggestions for future research.

The Legacy of AQ Khan: An Analysis of Illicit Trade Patterns in the Pre-enlargement European Union since the Exposure of the Khan Network and Recommendations for Preventing Future Catastrophe

Daniel Weitz – CURO SUMMER RESEARCH FELLOW & ROOSEVELT @ UGA
Dr. Gary Bertsch, Center for International Trade & Security, University of Georgia

Illicit trade of items that pose severe threats to international security has surfaced noticeably in recent years. The ever-increasing volume of global trade, the availability of assorted dangerous goods on the open market, and circumvention of international trade law have created an ideal environment for traffickers to procure and supply illicit goods. Consequently, illicit trafficking has become a subject of much international concern amongst academics, policymakers, and government officials alike. The term illicit trade encompasses numerous aspects of unlawful trafficking, including the types of goods being trafficked, the countries used as points of transit, and other variables. This paper focuses specifically on the trafficking of nuclear dual-use goods, defined as equipment and technologies with legitimate civilian and non-military uses that are exploitable for the construction of nuclear weapons. This topic is of critical importance because illicit transfers of nuclear dual-use items have already contributed to at least one nation's procurement of nuclear weapons, and future nuclear weapons developments by such means remains largely open unless effective measures are taken to deter proliferators. This paper seeks to analyze existing trends in the trafficking of nuclear dual-use equipment and technology throughout the pre-enlargement European Union since the 2003 procurement of nuclear weapons by the Pakistani national Abdul Qadeer Khan's illicit trafficking network. Through the creation of a database documenting cases of illicit trade based upon extensive open source research, this paper will offer an intensive analysis of trafficking trends in the countries most heavily linked to illicit trade. Furthermore, this paper will analyze the export and border controls of these countries and offer policy recommendations based on perceived deficiencies with the hope of curbing means of illicit trade currently available to traffickers.

The Effect of Age on Subject Doubling in French

Melissa E. Whatley
Dr. Diana Ranson, Department of Romance Languages, University of Georgia

Native speakers of French often produce utterances, such as "la grammaire c'est difficile", which exhibit Subject Doubling (SD), a noun, which alone could serve as a subject and a corresponding subject pronoun. While most examples of SD serve a pragmatic function, such as topic identification or comparison, others appear to serve no function. This fact has led several researchers to propose that the subject pronoun in spoken French is agglutinating to the verb, and that eventually every verb will be preceded by a pronoun despite its pragmatic function. The finding that younger speakers produce more SD than their older counterparts would support this hypothesis. This study is based on an aural analysis of 1,390 utterances with noun subjects in spontaneous conversations with 32 native speakers of French, recorded in Southern France in 2005 and 2006. The 16 younger speakers, 24 to 40 years old, produced a slightly higher percentage of SD than their 16 older counterparts, 43 to 78 years old (40% vs. 33%). These speakers also produced more pronouns lacking pragmatic functions (29 examples or 10% of the total number of pronouns) than the older speakers who produced only 16 such pronouns (8%). This 2% difference is not statistically significant. Even though younger speakers produced a higher percentage

of utterances with SD and a higher percentage of doubled pronouns with no pragmatic function, the finding that 63% of the utterances with noun subjects in the corpus do not exhibit subject doubling argues against the hypothesis that the subject pronoun is agglutinating to the verb. According to this research, French is not changing in this aspect of its verbal morphology.

Investigation of the Horizontal Transfer of Virulence Factors of *Staphylococcus aureus* between Humans and Companion Animals

Brooke L. Wheeler
Dr. Susan Sanchez, Athens Diagnostic Laboratory, University of Georgia

Staphylococcus aureus is part of human's transient microflora, found on approximately 20% of people at any time, occasionally causing opportunistic infection. Methicillin resistant *Staphylococcus aureus*, MRSA, emerged following the introduction of antibiotics to healthcare. Previously there has been a distinction between "hospital acquired" MRSA with resistance to multiple antibiotics and a "community acquired" MRSA that seemed unrelated to the healthcare settings, had fewer resistances, and sometimes had a leukocidin toxin that was especially virulent. A major concern is that companion animals are also reservoirs of the organism suggesting a greater potential of transmission. These animals have been insinuated as the sources of strains causing infections in their owners. To test the prediction that the MRSA strains found on companion animals are actually different from the ones that cause infections in humans, samples were taken from canines at the small animal teaching hospital. These were tested by PCR, all confirmed *mecA* positive, which shows the organism carries antibiotic resistance, and *nucA,* which is specific to *Staphylococcus aureus*. The positive samples were then tested by PCR for superantigens including SEA-SEE, SEG-SEJ, ETA, ETB and TSST-1. The strains were also typed and found to be genetically similar to the human strains USA900 and USA100, one seemingly identical to USA300. Though the strains found on humans and non-human animals came from a common original strain, the difference in the virulence factors found in the human versus the companion animal strain suggest that animals are being wrongfully blamed as the infection source.

Mothers' Parenting Styles and Their Toddlers' Compliance

Lionel (Leo) White
Dr. Hui-Chin Hsu, Department of Child & Family Development, University of Georgia

During the second year of life, toddlers develop their first sense of autonomy. Due to this dramatic change and the resulting difficult interactions with parents, this age period is typically referred as the "Terrible Twos." Parents may use different strategies to deal with their two year olds' misbehaviors. Within a larger longitudinal study from infancy to early childhood, an experiment of "Toys on Shelf" was designed to target toddlers' compliance following maternal orders. Children were instructed not to play with toys on the shelf by their mothers. The social interaction between a total of 73 two-and-a half-year-olds and their mothers were observed and videotaped. Previous research showed that young children's compliant behavior is related to their motivation to learn (Kochanska, Tjebkes, Forman 1998). This study will focus on the examination of whether and how mothers' parenting styles relate to different degrees of compliance with the child. The observation of child compliance, which varies from committed compliance (full endorsement of maternal agenda), to situational compliance (compliance is sustained by continuous maternal prompting), passive noncompliance (child ignores maternal directives without overt negativity), overt resistance (refusal or negotiation of maternal agenda), and to defiance (overt rejection of maternal agenda), is based on the system developed by Kochanska et al (1998). It is expected that maternal guidance (e.g. request, reason, positive evaluation, verbal/nonverbal empathy) contributes to toddlers' committed compliance, whereas maternal control (which includes negation, power assertion, reprimand, and bargaining)

contributes to the children's overt resistance and defiance. The detailed results and implications of mother-child interaction on the emotional development of the toddler will be discussed at the conference.

Investigation of State-controlled Media Outlets and Their Reports on Internal Conflict: A Xinjiang Province Case Study
Ashley A. Wilkinson
Dr. Stephen Shellman, Department of International Affairs, University of Georgia

My research concerns how state-run media depict internal conflict to the outside world, and whether foreign media report the situation differently or merely repeat the state-run media's viewpoint. In researching state-owned media reports of conflict I will perform a quantitative case study of the media coverage of the Xinjiang province of China. This study will consist of developing a scheme to codify the frequency, scope, magnitude, and political slant of several newspapers' coverage of the conflict in the Xinjiang province between Uighur nationalists and the Chinese government. I will code the frequency of reports and the frequency of particular terms used across different media sources, and I will code how the coverage differs in scope and magnitude, and how media sources on the left and right cover the conflict. Since the Chinese established the northwest territory known as the Xinjiang province, the native ethnic Uighurs have believed that the Chinese Han majority has infiltrated and repressed their culture. While some Uighur groups have tried to re-establish their sovereignty through protests, other groups such as the East Turkestan Liberation Front have gone as far as bombing buildings. China has taken a strong stance against Uighur nationalism, and since the Chinese government has great influence over its newspapers, I hypothesize that the Chinese media have an anti-Uighur bias. I also hypothesize that many Western papers have used state-run media sources in their reports without using other sources, and thus may be promulgating Chinese government opinions. This project is part of a growing body of research on both the influence of state-run media bias and the conflict in the Xinjiang province. I hope that this study contributes to future research on these topics.

The Broken Bridge: Discovering Why Alpha-Dystroglycan Loses Its Function
Jasmaine D. Williams – CURO SCHOLAR
Dr. Lance Wells, Department of Biochemistry & Molecular Biology, University of Georgia

Alpha-Dystroglycan (aDG) is a protein heavily glycosylated with N and O-linked sugar molecules that plays a key role in the function of muscles and neurons. Together with other proteins in a multiprotein complex, aDG establishes a necessary connection between the cytoskeleton within the cell and the extracellular matrix. Improper glycosylation of aDG has been associated with metastasis in certain cancers and genetic defects in the enzymes that add a particular type of glycosylation, known as O-mannosylation, to aDG result in improper function of the protein and congenital muscular dystrophy. The severity of the hypoglycosylation correlates with the severity of the resulting disease. The purpose of this project is to identify the key residues that cause aDG to lose its function. Chinese Hamster ovary (CHO) cells will be used to express the protein for these experiments since several existing CHO cell lines have known defects in specific glycosylation pathways. An epitope-tagged aDG expression plasmid and transient transfection conditions have been generated. We are currently in the process of purifying the wildtype protein taking advantage of the epitope tag and will be monitoring purification via Western blotting and silver staining of SDS-PAGE gels. Purified protein will be assessed for function via binding to laminin using surface plasmon resonance. Future work will focus on analyzing site-directed mutants of aDG that are defective in glycosylation as well as expressing the wildtype protein in CHO cells that are defective in specific glycosylation pathways. By doing so, we expect to discover the key residues and glycosylation types that are essential for proper

aDG function. This research is supported by the Muscular Dystrophy Association.

Titanium Carbide Nanocrystals: A Storage Medium for the Coming Hydrogen Economy?

Kathryn E. Williamson
Dr. Steven Lewis, Department of Physics & Astronomy, University of Georgia

As energy consumption continues to rise, the need for an alternative fuel supply has become ever more prevalent. The hydrogen economy offers great potential as the next source of energy delivery. Hydrogen is nonpolluting and abundant; however, more research needs to be done in the technology of production, storage, and use. Our research focuses on the storage issue. Nanocrystals are good candidates for hydrogen storage due to their high surface to volume ratios. Hydrogen atoms could be stored by binding to the surface or within the interiors of nanocrystals, and could later be extracted for use. We have concentrated on the class of nanocrystals called metal carbides, specifically titanium carbide. Titanium is a lightweight metal and, when compounded with carbon, the structure offers several good candidate sites for binding hydrogen. We have treated interatomic interactions quantum mechanically to understand accurately how hydrogen interacts with the titanium carbide nanocrystal and where it is likely to bind. This has been done using the Vienna Ab-initio Simulation Package (VASP), which is a robust, widely used program for solving the quantum mechanical equations numerically on supercomputers. These simulations reveal detailed microscopic information about the electronic structure and bonding energetics of the hydrogen/titanium carbide system. By comparing results for different configurations, we have determined likely locations for atomic and molecular hydrogen to bind and the strengths of these binding interactions.

Political and Social Foundations for Environmental Sustainability

Karen C. Wong
Dr. Andrew Whitford, Department of Public Administration & Policy, University of Georgia

Environmental sustainability is the long-term preservation of our environment for the future. The purpose of our essay is to quantitatively investigate several possible foundations for environmental sustainability, as measured across countries with varying geography, development patterns, social customs, and political arrangements. We first test two central hypotheses about the roles of democracy and federalism. Our study asks if democracy increases environmental sustainability and if federalism reduces sustainability. We also assess the roles of organized groups representing different kinds of environmental interests, development paths, and religious orientations. To measure sustainability, we use three measures of sustainability (environmental systems, environmental stresses, and human vulnerability) from the 2002 Environmental Sustainability Index (ESI). We find little evidence for variation in sustainability levels given variation in either democracy or federalism. However, we find that the effect of economic development (both current and historical) depends on the measurement of sustainability. Stress and vulnerability are affected by business practices and international environmental organizations (but environmental systems are not), and the effect of Protestant religious affiliations depends on our measurement of sustainability. Although these findings show no clear political foundation, they portray a complex and varied set of foundations for environmental sustainability.

Poppy Reliquaries* and *Tissue Ring
Laura Wood
Prof. Rob Jackson and Prof. Mary Hallam Pearse, Department of Jewelry & Metalwork, University of Georgia

My recent works reflect themes of memory and preciousness. Containment of the memory is a way for me to exemplify the importance of the object within. I pull inspiration for my work largely from my surroundings. *Poppy Reliquaries* were inspired by the poppy plant that grows throughout Italy. While living in Tuscany over the summer of 2006 I noticed the life cycle of these plants. While the plants were alive they were bright blooms and as they began to die their brightness would subside and they would eventually loose their petals, stiffen and turn beautiful colors of brown. The fragile poppies would remain until the weather took its toll. I wanted to give these plants a home for which I could protect and cherish them. The poppies remain a lasting memory of Italy. *Tissue Ring* also alludes to a memory. This piece was created to embody the characteristics of my mother and grandmother who often carried tissues on hand. The tissues were used for anything from blotting lips to blowing noses. I chose to honor this childhood memory. The tissue housed inside this piece evokes the memory and the ring is a means to contain a precious moment in time.

Molecular Regulation of Parathyroid Organogenesis in the Mouse
Shannon F. Yu – CURO SUMMER RESEARCH FELLOW, CURO SCHOLAR
Dr. Nancy R. Manley, Department of Genetics, University of Georgia

In mice, the parathyroid and thymus glands develop from shared primordia that form from the third pharyngeal pouch. The parathyroid glands are the most important endocrine regulator in maintaining calcium homeostasis in order to achieve the proper functioning of the nervous and muscular systems. At E 11.5, the parathyroid and thymus are morphologically indistinguishable, but can be marked with two organ-specific transcription factors: Gcm2 and Foxn1, respectively. Consistent with its expression pattern, $Gcm2^{-/-}$ mutant mice are aparathyroid. Analysis of the third pouch-derived primordium in $Gcm2^{-/-}$ mutants showed that the parathyroid gland was present prior to E12.5 and was lost due to apoptosis between E12-12.5. Additional gene marker analysis excluded the possibility that Gcm2 is required for pouch patterning or for the establishment of the parathyroid domain, but did find evidence for a requirement for *Gcm2* in differentiation and subsequent survival of parathyroid cells. Previous research from our lab has implicated Shh in the regulation of *Gcm2*, which is undetectable in $Shh^{-/-}$ mutant mice. Changes in the expression of *Gcm2* suggest that a Shh gradient is responsible for establishing the location of *Gcm2* expression. *In situ hybridization* analysis of the $Shh^{flx/flx}$ allele, which exhibits a reduced range of diffusion, did not reveal any phenotypic change at E11.5, and

demonstrated *PTH* expression at E12.5, indicating normal parathyroid differentiation. Analysis of the *ShhN* allele, which demonstrates an extended range of diffusion, revealed concurrent expansion of *Gcm2* and *Tbx1* expression, supporting a role for Shh in regulating parathyroid organogenesis. Thus, the data support our model in which Shh regulates *Gcm2* expression in a concentration-dependent manner.

The Effects of Colostral Leukocytes on TNFα Levels in Neonatal Calves
Leilah D. Zahedi – CURO APPRENTICE
Dr. David Hurley, Department of Large Animal Medicine, University of Georgia

Colostrum, the "first milk" produced by all mammals, contains many immunological components, including immunoglobulin, cytokines, and maternal leukocytes that help protect the neonate in the first days after birth. Tumor necrosis factor alpha (TNFalpha) is a cytokine associated with immune function and an activator of inflammatory responses in the body. It is not clear, however, how colostral leukocytes affect TNFalpha levels in the neonate. The purpose of this project is to determine the effects of maternal cells in colostrum on serum concentrations of TNFalpha in neonatal calves. Calves were fed either whole colostrum (C), frozen colostrum (FC), or cell-free colostrum (CFC) within 6 hours of birth. Blood samples were collected before the calves were fed colostrum, 1 day, 2 days, and 7 days after feeding. TNFalpha levels were measured using a TNFalpha specific ELISA assay, and samples were compared to a standard curve using recombinant bovine TNFalpha protein. Preliminary results indicate that at birth all calves have levels of TNFalpha below 2 ng/mL. At 24 hours, the calves receiving CFC had the highest level of circulating TNFalpha (mean 29 ng/mL), the calves receiving FC had moderate TNFalpha concentrations (mean 16 ng/mL) and the calves receiving C had the lowest TNFalpha concentrations (mean 12 ng/mL). By 48 hours, serum concentrations of TNFalpha were similar in all groups (mean 13 ng/mL). The results for samples collected 7 days after feeding are being determined. These results are consistent with the concept that transfer of maternal leukocytes reduces early inflammatory activation in he neonate.

Lectin Histochemistry of Cell-surface Glycoproteins of the Non-pathogenic Ciliate *Tetrahymena thermophila* and the Pathogenic Ciliate *Ichthyophthirius multifiliis*
Jessica Zaleon – CURO APPRENTICE
Dr. Thomas Krunkosky, Department of Veterinary Anatomy & Radiology, University of Georgia

The non-pathogenic ciliated protozoan, *Tetrahymena thermophila*, is a suitable candidate for the expression of heterologous surface proteins from a pathogenic ciliated protozoan, *Ichthyophthirius multifiliis*. *I. multifiliis* expresses abundant membrane proteins known as immobilization antigens, or i-antigens. These proteins elicit an immune response in the infected host and are the focus of vaccine development. *I. multifiliis* theronts and *T. thermophila* cells will be analyzed using a panel of highly purified lectins. These biotinylated proteins bind to cell-surface glycoproteins and will be utilized in immunohistochemical methods to detect them. In addition, cell-surface glycoproteins of *T. thermophila* expressing *I. multifiliis* i-antigens will also be analyzed with these lectins. Of particular interest will be the detection of any differences in the lectin staining as a result of the i-antigen expression in *T. thermophila*. The results of this study will elucidate the effectiveness of utilizing lectin histochemistry as a detector of changes that might occur in the staining pattern of cell-surface carbohydrates when a heterologous surface protein is expressed in a non-pathogenic host. With the findings of this study, the potential effectiveness of *T. thermophila* as a vaccine expression vector will be elucidated.

The Center for Undergraduate Research Opportuntities is grateful to the following sponsors for underwriting the 2007 Symposium.

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The CURO 2008 Symposium will be held on April 7, 2008 at the University of Georgia.

CURO

Center for Undergraduate Research Opportunities

Symposium 2008

March 31, 2008

Classic Center
Athens, Georgia

Program and Book of Abstracts

Creating a Culture of Undergraduate Inquiry

The Honors Program's
Center for Undergraduate Research Opportunities

2008 Symposium Program and Abstracts

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Table of Contents

CURO
Center for Undergraduate Research Opportunities

Symposium 2009

University of Georgia
Classic Center, 300 N. Thomas Street
March 30, 2009

CALL FOR ABSTRACTS

The Center for Undergraduate Research Opportunities at the University of Georgia provides a forum for all undergraduates to present original research and creative works sponsored by faculty members. Undergraduate students from all disciplines are encouraged to participate. Representatives of public and private higher education institutions in Georgia are encouraged to apply.

Presentations may be in the form of an oral presentation, poster session, exhibition, performance, or work of art. Students can also present a tutorial about a research methodology or new technology. Undergraduate researchers who are at various stages of the research process are encouraged to submit abstracts describing where they are in the research process and the issues they face. Those who wish to present their work should submit an application and an abstract of a maximum of 250 words and a brief supporting letter from the sponsoring faculty member via the CURO web site no later than January 16, 2009. Group research projects should be submitted with one application and one letter of faculty support. All abstracts will receive graduate student peer review with faculty guidance. All participants accepted into the Symposium will be notified by February 27, 2009, and their abstracts will be published in a book of abstracts. Sponsoring faculty will be invited to preside at their students' sessions.

Best Paper Awards
Papers on work being presented at the CURO Symposium submitted by March 13, 2009 will be considered for Best Paper awards in the categories of humanities, social sciences, civic responsibility focus, international focus, and sciences. Papers must be submitted electronically to curo@uga.edu. Maximum length is 20 pages, double spaced.

Purpose of the Symposium:
- To highlight excellence in research by undergraduate students
- To enrich the undergraduate experience by promoting communication and cooperation between faculty and students
- To provide a forum for undergraduates to communicate and disseminate their research findings and creative works
- To provide an opportunity for undergraduate researchers in the state of Georgia to engage with their peer researchers

Criteria for Selection:
- Originality and quality of research
- Quality of written abstract
- Ethical and responsible research
- Extent of the undergraduate student's involvement in development of the research design and execution of the project. Research presented at the Symposium should go beyond work completed for a class paper or project
- A letter of support from supervising faculty

This event will be free and open to the public. All interested faculty and students are encouraged to attend the CURO 2008 Symposium. For more information, contact curo@uga.edu, (706) 542-5871.

Monday, March 31, 2008

Begin registration of oral and poster presenters; Students hang up posters — **8:00 a.m.**
Classic Center, Lobby

Concurrent Oral Sessions — **10:10 a.m.**
Classic Center, Athena Breakout Rooms A, B, C, D, G, H, I, J

Concurrent Oral Sessions — **11:15 a.m.**
Classic Center, Athena Breakout Rooms A, B, C, D, G, H, I, J

Concurrent Oral Sessions — **12:20 p.m.**
Classic Center, Athena Breakout Rooms C, D, G, H, I, J

Concurrent Oral Sessions — **1:25 p.m.**
Classic Center, Athena Breakout Rooms C, D, G, H, I, J

Creative Writing & Music — **1:25 p.m.**
Classic Center, Athena Ballroom E

Concurrent Oral Sessions — **2:30 p.m.**
Classic Center, Athena Breakout Rooms G, H, I, J

Welcome and Opening Session — **4:00 p.m.**
Classic Center, Athena Ballroom E — **Dr. David S. Williams**, Director, Honors Program

The Value of Undergraduate Research — **Dr. David C. Lee**, Vice President for Research

Recognition of CURO Promising Scholars — **Dr. Pamela B. Kleiber**, Associate Director, Honors Program

Introduction of Keynote Speaker — **Ashley L. Foster**, Honors Program student and CURO Scholar

Keynote Address: *"Global Climate Change and Georgia: The Challenges Are Mounting"* — **Dr. James Porter**, Josiah Meigs Distinguished Teaching Professor, Eugene Odum School of Ecology

Announcement of Excellence in Undergraduate Research Mentoring Awards — **Prof. Jere Morehead**, Vice President for Instruction

Poster Session & Reception — **5:00 p.m.**
Classic Center, Athena Ballroom F

CURO Apprentice & Promising Scholars Dinner **6:15 p.m.**
Olympia Rooms

Art Gallery Talks **6:15 p.m.**
Classic Center, Fire Hall
Dr. Pamela B. Kleiber
Associate Director, Honors Program
Prof. Georgia Strange
Director, Lamar Dodd School of Art
Ms. Nora Wendl
Gallery Director, Lamar Dodd School of Art

Announcement of CURO Summer Research Fellows, CURO Scholars, UGA Libraries Undergraduate Research Awards, and Best Paper Awards **8:00 p.m.**
Classic Center, Fire Hall
Dr. David S. Williams
Director, Honors Program
Ms. Florence E. King
Assistant University Librarian for Human Resources
and Director, Student Learning Center Electronic Library
Ms. Deborah Dietzler
Executive Director, UGA Alumni Association

Monday, March 31, 2008

Concurrent Oral Sessions

Classic Center, Athena Breakout Rooms A, B, C, D, G, H, I, J

10:10 – 11:00 a.m. First Concurrent Session

Room A	**Rachel Dolan**	Two Faced Politicians: Political Supply versus Constituent Demand in Health Rationing Policy
	Faculty Mentor	Dr. Anthony Bertelli, Department of Public Administration & Policy
	Amy K. Winter	HIV/AIDS in India: A Case Study on the Influence of Traditional and Modern Indian Characteristics on the HIV/AIDS Epidemic among Indian Youth
	Faculty Mentor	Dr. Dr. Nan McMurry, Department of History
	Catherine P. Mencher	The Case for Minor Access to Emergency Contraceptive
	Faculty Mentor	Dr. Monica Gaughan, Department of Health Policy & Management
Room B	**Cain Harrelson**	The Diplomatic Face of America: Promoting Diversity in the U.S. Foreign Service
	Faculty Mentor	Dr. Kaye Sweetser, Department of Advertising & Public Relations
	Rachel A. Spencer & Sarah Vaughn	"In the Shadows of Espionage": Extraordinary Rendition as a Threat to American National Security
	Faculty Mentor	Dr. Loch Johnson, Department of International Affairs
	Alexander B. Johnson	The U.S. Intelligence Community Must Become Centralized
	Faculty Mentor	Dr. Loch Johnson, Department of International Affairs
Room C	**Ashley A. Wilkinson**	Determining the Truth: The War on Terror and Repression in China
	Faculty Mentor	Dr. David S. Williams, Honors Program
	John T. Dixon	U.S.-China Energy Cooperation: A Step toward Greater Environmental Cooperation
	Faculty Mentor	Dr. Rhett Jackson, Department of Forestry
	Aaron M. Sayama	A Feasible Trilateral Agreement: A Convergence of Interests
	Faculty Mentor	Dr. Dr. Seema Gahlaut, Center for International Trade & Security

Room D	**Robert Rosenbleeth & Rocky T. Cole**	Avoiding Overcorrection: Solving the Army's Readiness Crisis
	Faculty Mentor	Dr. Patricia Sullivan, Department of International Affairs
	William Patrick Dever	Reforming Subsidies in the Federal Budget
	Faculty Mentor	Dr. William Lastrapes, Department of Economics
	Karen E. Tanenbaum	Diversity and State-Building: A Cross-Country Analysis of the U.S. and Canada
	Faculty Mentor	Dr. Christopher Allen, Department of International Affairs
Room G	**Lillie Ann M. Madali**	The Joys of Hunting: Analyzing the Relationship between the Small Hunt Mosaic of Piazza Armerina in the Architectural Space of the Hiemale Triclinium
	Faculty Mentor	Dr. Asen Kirin, Department of Art History
	Jason E. Dyer	A Domitianic Predecessor to the Arch of Constantine?
	Faculty Mentor	Prof. James Anderson, Jr., Department of Classics
	Stefann S. Plishka	George Washington and Abraham Lincoln: Relic Veneration and "Saint" Commemoration in Contemporary America
	Faculty Mentor	Dr. Asen Kirin, Department of Art History
Room H	**Cleveland A. Piggott**	The Role of Microtubules in the Formation and Degradation of Hirano Bodies
	Faculty Mentors	Dr. Marcus Fechheimer, Department of Cellular Biology Dr. Ruth Furukawa, Department of Cellular Biology
	Tulsi Patel	Generating Uniform Proliferation of Neuroprogenitor Cells
	Faculty Mentor	Dr. Steven Stice, Department of Animal & Dairy Science
	Neil T. Pfister	Characterizing RNA-Protein Complexes in *Pyrococcus furiosus*
	Faculty Mentor	Dr. Michael Terns, Department of Biochemistry & Molecular Biology
Room I	**Joshua A. Dunn**	Roswell Voices: Oral History and Linguistics in Roswell, Georgia
	Faculty Mentor	Dr. Dr. William Kretzschmar, Department of English and Department of Linguistics
	Jana M. Hanchett	Hispanic Music in Athens, Georgia
	Faculty Mentor	Dr. David Schiller, Department of Musicology & Ethnomusicology
	Andrew C. Clark	French Dislocation: The Syntax of Power
	Faculty Mentor	Dr. Diana Ranson, Department of Romance Languages

Room J	**Darryl Tricksey & Dakia McCray**	African-American Models of Success
	Faculty Mentors	Dr. Victoria Plaut, Department of Psychology Dr. Larry Nackerud, School of Social Work
	Erica Holland	The N-Word and Its Implications on a Predominately White Campus
	Faculty Mentor	Dr. Robert Pratt, Department of History
	Jennifer L. Barr	Examining Parenting Stress for Mothers of Young Children with Autism Spectrum Disorders
	Faculty Mentor	Dr. Dr. Jonathon Campbell, Department of Educational Psychology & Instructional Technology

11:15 a.m. – 12:05 p.m. Second Concurrent Session

Room B	**Shelby R. Carlson, Holly Chandler, Heather Smith & Rebecca Lewis**	Emotional and Behavioral Problems Displayed in Preschoolers Raised by Biological Grandchildren
	Faculty Mentor	Dr. Dr. Tsu-Ming Chiang, Department of Psychology, Georgia College & State University
	Nicole M. Fenton & Emily Osborn	The Impact of Family Relations, Health Perceptions, and Parental Functioning on Adherence and Medical Outcomes in Adolescent Transplant Recipients
	Faculty Mentor	Dr. Ronald Blount, Department of Psychology
	Ashley A. Wilkinson	Ending the Waiting List Crisis: Increasing Child Care Subsidy Funds
	Faculty Mentor	Dr. Thomas McNulty, Department of Sociology
Room C	**Halina Maladtsova**	Eliminating the Road Test in License Renewal Programs
	Faculty Mentor	Dr. Christopher Cornwell, Department of Economics
	Lila E. Tedesco	Mixed Income Housing: A Comprehensive Reconstruction Plan for New Orleans
	Faculty Mentor	Dr. Andrew Carswell, Department of Housing & Consumer Economics
	Terry L. Palmer	Reducing and Rethinking Recidivism
	Faculty Mentor	Dr. Mark Cooney, Department of Sociology
Room D	**Lauren F. Kelly**	*Eres un Universo de Universos:* Reconnecting With the Human Aspects of Medicine Through Field Experiences on *La Isla de Ometepe*
	Faculty Mentor	Dr. Pamela B. Kleiber, Honors Program

	Lee Ellen Carter	Otavaleños and Cotacacheños: Local Perceptions of Sacred Sites for Farmscape Conservation in Highland Ecuador
	Faculty Mentor	Dr. Fausto Sarmiento, Department of Geography
	Adam Thomas	Perceptions of Puerto Rican Women and Their Impact on Public Health Policy in the Early 20th Century
	Faculty Mentor	Dr. Reinaldo Román, Department of History
Room G	**Brian T. Laughlin**	Functional Analysis of the *Magnaporthe grisea* Secretome
	Faculty Mentor	Dr. Sheng-Cheng Wu, Complex Carbohydrate Research Center
	Matthew C. Agan	Epistasis for Fitness among Biosynthesis Genes in Yeast
	Faculty Mentor	Dr. David Hall, Department of Genetics
	Amy J. Burrell	Transcriptional Expression of Arabidopsis GAUT Genes: 15 Proven and Putative Plant Cell Wall Biosynthetic Galacturonosyltransferases
	Faculty Mentor	Dr. Debra Mohnen, Complex Carbohydrate Research Center
Room H	**Erika D. Frank**	La Voz de los Sin Voz: The Use of Radio by the Zapatista Movement in Mexico
	Faculty Mentor	Dr. Pamela Voekel, Department of History
	Lucas L. Puente	The Importance of American Development Aid in Nicaragua
	Faculty Mentor	Dr. Santanu Chatterjee, Department of Economics
	Clare J. Hatfield & Maggie Mills	The Road to Violence: Nonviolent v. Violent Actors in Bangladesh
	Faculty Mentor	Dr. Mia Bloom, Department of International Affairs
Room I	**Prashant Monian**	Expression of Glycerophospholipids in Rat Brain after Cocaine Withdrawal
	Faculty Mentor	Dr. Brian Cummings, Department of Pharmaceutical & Biomedical Sciences
	Steven P. Trau	IS492 Movement on the *Pseudoalteromonas atalantica* Chromosome
	Faculty Mentor	Dr. Anna Karls, Department of Microbiology
Room J	**Jessica N. Van Parys**	Does Writing Ability Predict Academic Achievement? Evidence from the New SAT Writing (SATW) Section
	Faculty Mentor	Prof. David Mustard, Department of Economics
	Ashley A. Babcock	The Engineering Learning Environment
	Faculty Mentor	Dr. Nadia Kellam, Department of Biological & Agricultural Engineering

	Mary K. Holder, Marcia A. Cole, Bette' S. Ford & Destiny L. Murray	Solving Rubik's Cube: Artificial Selection in Higher Education
	Faculty Mentor	Dr. Farooq Khan, Department of Chemistry, University of West Georgia

12:20 – 1:10 p.m. Third Concurrent Session

Room C	**Mia Catherine Morgan**	Potential Economic Impact from Zeolite Use in Uganda
	Faculty Mentor	Dr. William Kisaalita, Department of Biological & Agricultural Engineering
	Ellyn A. Echols & Jeremy Akin	Rethinking the U.S.'s Relationship with the Global Poor: A Restructuring of USAID's Microfinance Efforts in Africa
	Faculty Mentor	Dr. Glenn Ames, Department of International Public Service & Outreach
	Alex Kazer	Hope for the Horn: The Case for the Recognition of Somaliland
	Faculty Mentor	Dr. Abdulahi Osman, Department of International Affairs
Room D	**Sharanya Raghunath**	Characterization of Human Stem Cells Using Quantitative RT-PCR
	Faculty Mentor	Dr. Kelley Moremen, Department of Biochemistry & Molecular Biology
	Laura J. Simpson	The Naturally Attenuated TCC Strain of *Trypanosoma cruzi* Induces a Specific CD8+T Central Memory Response
	Faculty Mentor	Dr. Rick Tarleton, Department of Cellular Biology
Room G	**Rebecca I. Lunceford**	Tort Cases in Georgia in the Early 2000s: Tort Abuse Not as Prominent as Portrayed
	Faculty Mentor	Prof. David Mustard, Department of Economics
	Karen C. Wong	Regional Comparison of the Legal Basis of Venture Philanthropy
	Faculty Mentor	Dr. Andrew Whitford, Department of Public Administration & Policy
	Meghan A. Royal	The Impact of Chinese Product Fraud and Lack of Quality Control on U.S. Commercial Trade Laws and Regulations
	Faculty Mentor	Prof. Marisa Pagnattaro, Department of Legal Studies
Room H	**James T. Gordy**	Characterizing the Small Proteome in the Hyperthermophilic Archaeon *Pyrococcus furiosus*
	Faculty Mentor	Dr. Michael Adams, Department of Biochemistry & Molecular Biology

	Kathryn S. Flake	Cloning, *E. coli* expression, and HPLC Enzymatic Assay Analysis of Putative Domains of Arabinose Kinase
	Faculty Mentor	Dr. Maor Bar-Peled, Complex Carbohydrate Research Center
Room I	**Delila D. Wilburn**	Black Women and the Movements: Using Art to Re-Define Beauty
	Faculty Mentor	Dr. Barbara McCaskill, Department of English
	Traci N. Tucker	A Cross-Cultural Comparison of Gender and Role-Identities in China and the United States
	Faculty Mentor	Dr. Dawn Robinson, Department of Sociology
	Matthew G. Anderson, Lindsay Bailey, Christopher Newberry & Jimmie Flower	The Influence of Family Structure on Aggression Displayed in Young Head Start Children
	Faculty Mentor	Dr. Tsu-Ming Chiang, Department of Psychology, Georgia College & State University
Room J	**Laura C. Patterson**	The Application and Adaptability of N.A. Rimsky-Korsakov's Orchestration Techniques Across National Styles in Orchestral Program Music
	Faculty Mentor	Dr. David Haas, Department of Musicology & Ethnomusicology
	Tyler L. Kelly	Usage of Linear Subspaces with Varieties
	Faculty Mentor	Dr. Elham Izadi, Department of Mathematics
	Caroline M. Anderson	A Psychological View of Wolf/ Mörike's Peregrina Songs
	Faculty Mentor	Dr. Max Reinhart, Department of Germanic & Slavic Languages

1:25 – 2:15 p.m. Fourth Concurrent Session

Room C	**Robert M. Truan**	Antonio Vivaldi's Contribution to the Evolution of Program Music
	Faculty Mentor	Dr. Susan Thomas, Department of Musicology & Ethnomusicology and Institute for Women's Studies
	Victor M. Orellana	The Homeric Lineage of Lautaro in Ercilla's *La Araucana*
	Faculty Mentor	Dr. Nicolás Lucero, Department of Romance Languages
Room D	**Kevin K. Chang**	Improving the Health of Georgia Youth: An Incentive Program for Nutritional Standards in Georgia Schools
	Faculty Mentor	Dr. Phaedra Corso, Department of Health Administration, Biostatistics & Epidemiology

	Lauren M. Lesso, Susan Hulteen, Christopher Newberry, Kim Mears, Christina Borne & Alex Carson	The Impact of Low Income Families on the Development of Literacy
	Faculty Mentor	Dr. Tsu-Ming Chiang, Department of Psychology, Georgia College & State University
Room G	**Tyler B. Pratt**	The Global Arms Bazaar: Lessons from the 2006 Hezbollah-Israel War
	Faculty Mentor	Dr. Michael Jasinski, Department of International Affairs
	Nathaniel T. Edwards	Increasing Trade Security: United States-Venezuelan Trade Incentives
	Faculty Mentor	Dr. Christopher Allen, Department of International Affairs
	Chris Chiego	Managing U.S. Aid to Egypt: A Reorientation of Current Support
	Faculty Mentor	Dr. Brock Tessman, Department of International Affairs
Room H	**Jessica L. Mobley**	Is a Hepatitis E-Like Virus Found In Cats and Does It Cause Hepatitis?
	Faculty Mentor	Dr. Elizabeth Howerth, Department of Pathology
	Jessica L. Buday	Charcoal-Powered Vacuum-Zeolite Adsorption Cooler Regenerator for the Preservation of Milk, Vaccines, and Other Perishables
	Faculty Mentor	Dr. William Kisaalita, Department of Biological & Agricultural Engineering
	Natasha A. James	The Ecology of Enteric Bacterial Isolates in San Luis, Costa Rica
	Faculty Mentor	Dr. Susan Sanchez, Department of Infectious Diseases
Room I	**Sarah R. Breevoort**	Towards the Discovery of Ras-Converting Enzyme Inhibitors-A Novel Anti-Cancer Target
	Faculty Mentor	Dr. Walter Schmidt, Department of Biochemistry & Molecular Biology
	Claire M. Rice	In Vitro Assay to Measure Cell Growth and Invasion
	Faculty Mentor	Dr. Bruce LeRoy, Department of Pathology
	Nithya M. Natrajan	The Roles of Non-homologous End Joining Repair Proteins in Non-B-DNA Structure Induced Genetic Instability
	Faculty Mentors	Dr. Karen Vasquez, Department of Carcinogenesis, University of Texas Dr. Mary Bedell, Department of Genetics

Room J	**Anna E. Hudson**	Using Surface Enhanced Raman Spectroscopy for the Detection of Pathogens
	Faculty Mentor	Dr. Richard Dluhy, Department of Chemistry
	Matthew Logan Davis	Long-Range Retrograde Transduction of Survival Signals in Neurons
	Faculty Mentor	Dr. James Franklin, Department of Pharmaceutical & Biomedical Sciences
	Anita C. Randolph	Functionality of Glutamate Receptors in hESC-derived Neural Progenitors vs. Matured Neurons
	Faculty Mentor	Dr. Steven Stice, Department of Animal & Dairy Science

1:25 – 3:20 p.m. Creative Writing & Music

Classic Center, Athena Ballroom E

Jordan A. Dalton	*Room–Poem*
Faculty Mentor	Prof. Andrew Zawacki, Department of English
Soujourner Hodges	*Book of Trees* (selections)
Faculty Mentor	Dr. Adrian P. Childs, Department of Music Theory & Composition
Brandon Kaufman & Kim Nogi	*Duet of Soprano and Bass Clarinet*
Faculty Mentor	Dr. Roger Vogel, Department of Music Theory & Composition
Brian Graiser	*Sketches in Noir* (selections)
Faculty Mentor	Dr. Leonard V. Ball, Jr., Department of Music Theory & Composition
Bulldog Brass Quintet: Tommy Cox, Josh Cutchin, Cathy Kilroe-Smith, Chris Probst, Aaron Ritter & Brad Whitfield	*Contemporary Brass Sounds* (selections)
Faculty Mentor	Prof. Fred Mills, Director & Department of Brass
Opera Ensemble: Jason Blanton, Ben Dawkins, Andrew Frazier, John Ford, Danielle Granati, Kathryn Sabol, Ronaldo Steiner, Megan Tucker, Kristen Vanderoef, Brett Vogel, Katherine Walters & Chloe Zeitounian	*From Page to Stage*
Faculty Mentors	Prof. Frederick Burchinal, Director & Department of Voice Prof. Gary DiPasquasio, Pianist/Music Director & Department of Voice

2:30 – 3:45 p.m. Fifth Concurrent Session

Room G	**Ashley A. Bowen**	Are We Really Ready? The Need for National Standards and the Creation of the Cycle of Emergency Planning
	Faculty Mentor	Dr. Brock Tessman, Department of International Affairs
	Nicole C. DeMarco & Aqsa Mahmud	Emergency Response: Bringing it to Georgia
	Faculty Mentor	Dr. Michael Beck, International Center for Democratic Governance
	Kelsey A. Jones	You Are What You Eat: Mandating Point-of-Purchase Nutrition Information in Georgia Restaurants
	Faculty Mentor	Dr. Marsha Davis, Department of Health Promotion & Behavior
Room H	**Michael D. Mogill**	Oxygen Delivery After Ischemia in Active and Inactive Subjects
	Faculty Mentor	Dr. Kevin McCully, Department of Kinesiology
	Yen Tran	Comparison of the Acute Toxicity of Selective Serotonin Reuptake Inhibitors (SSRIs) and St. John's Wort (*Hypercium perforatum*) to *Ceriodaphnia dubia*
	Faculty Mentor	Dr. Marsha Black, Department of Environmental & Health Sciences
	Kimberley L. DeLisi	The Effect of Sample Handling and Storage on the Accuracy and Repeatability of Fecal Worm Egg Counts in Horses
	Faculty Mentor	Dr. Ray Kaplan, Department of Infectious Diseases
	Christina L. Faust	Environmental Factors Affecting the Persistence of Avian Influenza Virus in Water
	Faculty Mentor	Dr. David Stallknecht, Department of Wildlife Disease Study
Room I	**Leilah D. Zahedi**	Permeability of Intestinal Cells Exposed to Black Walnut Extract
	Faculty Mentor	Dr. David Hurley, Department of Population Health
	Seychelle M. Vos	Sequencing and Tissue Distribution of Toll-Like Receptor 3 in White-tailed Deer
	Faculty Mentor	Dr. Elizabeth Howerth, Department of Pathology
	Robert D. Bennett	Can Smallholder Dairy Farmers of Southwestern Uganda Save Their Evening Milk?
	Faculty Mentor	Dr. William Kisaalita, Department of Biological & Agricultural Engineering

	Aaron O. Watwood	Design Evolution of Non-Electric Evaporative-Cooling Milk Container for Smallholder Farmers in East Africa
	Faculty Mentor	Dr. William Kisaalita, Department of Biological & Agricultural Engineering
Room J	**Sean P. Durning**	Antibody Extraction
	Faculty Mentor	Dr. Lance Wells, Department of Biochemistry & Molecular Biology
	Ashley L. Foster	Voltage-Dependent Anion Conductance (VDAC) Porin: A Possible Channel for Cytochrome c Release in Apoptosis
	Faculty Mentor	Dr. James Franklin, Department of Pharmaceutical & Biomedical Science
	Purvi S. Sheth	Characterization of *Mycobacterium shottsii*
	Faculty Mentor	Dr. Russell Karls, Department of Infectious Diseases

4:00 p.m. Welcome and Opening Session

Classic Center, Athena Ballroom E

Welcome	Dr. David S. Williams, Director, Honors Program
The Value of Undergraduate Research	Dr. David C. Lee, Vice President for Research
Recognition of CURO Promising Scholars	Dr. Pamela B. Kleiber, Associate Director, Honors Program
Introduction of Keynote Speaker	Ashley L. Foster, Honors Program student and CURO Scholar
Keynote Address ***Global Climate Change and Georgia: The Challenges Are Mounting***	Dr. James Porter Josiah Meigs Distinguished Teaching Professor, Eugene Odum School of Ecology
Excellence in Undergraduate Research Mentoring Awards	Prof. Jere Morehead, Vice President for Instruction

5:00 p.m. Poster Presentations and Reception

Classic Center, Athena Ballroom F

Kyle F. Abramowicz	Aggressive Behavior and Prezygotic Isolation in *Drosophila persimilis* and *D. pseudoobscura*
Faculty Mentor	Dr. Wyatt Anderson, Department of Genetics

Ashley A. Babcock	The Engineering Learning Environment
Faculty Mentor	Dr. Nadia Kellam, Department of Biological & Agricultural Engineering
Robert D. Bennett	Can Smallholder Dairy Farmers of Southwestern Uganda Save Their Evening Milk?
Faculty Mentor	Dr. William Kisaalita, Department of Biological & Agricultural Engineering
Andrew D. Bosson	The Role of Rif1 in *Kluyveromyces lactis* Telomere Maintenance
Faculty Mentor	Dr. Michael McEachern, Department of Genetics
Emily Dale Broder	Forced Copulation and Offspring Viability in *Drosophila melanogaster*
Faculty Mentors	Dr. Wyatt Anderson, Department of Genetics Dr. Yong-Kyu Kim, Department of Genetics
Nancy D. Brynteson	"I Want My Credits!": The Impact of Procedural and Interactional Injustice on Participants' Evaluations of an Experimenter
Faculty Mentor	Dr Alicia Bembenek, Department of Psychology, Georgia College & State University
Jessica L. Buday	Charcoal-Powered Vacuum-Zeolite Adsorption Cooler Regenerator for the Preservation of Milk, Vaccines, and Other Perishables
Faculty Mentor	Dr. William Kisaalita, Department of Biological & Agricultural Engineering
Joseph S. Burch	Characterization of Mitoferrin and Its Interactions with Ferrochelatase
Faculty Mentor	Dr. Harry Dailey, Biomedical & Health Sciences Institute
Jean Chi	Evaluating Protocols for Measuring Immune Defenses in Larval Monarch Butterflies
Faculty Mentor	Dr. Sonia Altizer, Eugene Odum School of Ecology
Eric P. Cho	Contours and Melting Crystals
Faculty Mentor	Dr. Robert Varley, Department of Mathematics
Caroline G. Colden	Nipah Virus and Apoptosis in Cells
Faculty Mentor	Dr. Corrie Brown, Department of Pathology
Benjamin P. Crane	Physical and Structural Basis for pH Dependence of Transcription Regulation by the Anti-Sigma Factor AsiA
Faculty Mentor	Dr. Jeffrey Urbauer, Department of Biochemistry & Molecular Biology
Vanessa N. del Valle	The Role of Insulin-Induced Tyrosine Phosphorylation on O-GlcNAc Transferase (OGT)
Faculty Mentor	Dr. Lance Wells, Department of Biochemistry & Molecular Biology

Melissa D. Docampo	Metabolic Studies in *Toxoplasma gondii*
Faculty Mentor	Dr. Boris Striepen, Department of Cellular Biology
Andrew M. Durso	Cataloging Biodiversity: Filling in the Gaps for Coastal Ecuadorian Herpetofauna
Faculty Mentor	Dr. Paul Hamilton, Department of Biological Sciences
Jessica E. Dyke	Sex-Related Differences in Pain Experience in Marathon Runners
Faculty Mentor	Dr. Patrick O'Connor, Department of Kinesiology and Department of Exercise Psychology
Ryan M. Friday	Vesicular Stomatitis in Cattle
Faculty Mentor	Dr. Corrie Brown, Department of Pathology
Steven A. Gay	Potential Novel O-N-acetylglucosamine Transferase (OGT) Downregulation Technique for *D. rerio*
Faculty Mentor	Dr. Scott Dougan, Department of Cellular Biology
Elizabeth K. George	Association Between Infant Feeding and Overweight/Obesity in Ghana, West Africa
Faculty Mentor	Dr. Alex Anderson, Department of Food & Nutrition
Samantha J. Haring	Corticosterone and Its Effects on Stress-Induced Weight Loss
Faculty Mentor	Dr. Ruth Harris, Department of Food & Nutrition
Laura M. Harrison	Newcastle Disease Pathogenesis
Faculty Mentor	Dr. Corrie Brown, Department of Pathology
Lauren F. Kelly	*Eres un Universo de Universos:* Reconnecting with the Human Aspects of Medicine Through Field Experiences on *La Isla de Ometepe*
Faculty Mentor	Dr. Pamela B. Kleiber, Honors Program
Lauren F. Kelly	The Role of Plasminogen Activator Inhibitor-1 (PAI-1) in the Immunopathogenesis of *Plasmodium falciparum*-mediated Placental Malaria
Faculty Mentor	Dr. Julie Moore, Department of Infectious Diseases
Christine M. Kendrick	Evaluation of Potential Inhalation Hazards of Petroleum-, Synthetic- and Bio-Fuels Using GC/MS Analysis of Vapors under Equilibrium Conditions
Faculty Mentor	Dr. Jeffrey Fisher, Department of Environmental & Health Sciences
Karen S. Kenner	Finding the Best Protocol to Homogenize Carbon Nanotubes
Faculty Mentor	Dr. Marcus Lay, Department of Chemistry

Noah A. Koon	Mutagenesis Analysis of the Chain Length Determination Domain of the *Toxoplasma gondii* Farnesyl Diphosphate Synthase
Faculty Mentor	Dr. Silvia Moreno, Department of Cellular Biology
Andrew F. Kragor	Unbiased Isolation of Alpha-Dystroglycan
Faculty Mentor	Dr. Carl Bergmann, Complex Carbohydrate Research Center
James P. MacNamara	Inhibition of the CaaX Proteases Rce1p and Ste24p with Peptidyl (Acyloxy)Methyl Ketones (AOMK) and Quinolinol Based Molecules
Faculty Mentor	Dr. Timothy Dore, Department of Chemistry
Margaret C. Madean & Sohyun Kwon	Female Choice and Male Mating Success in *Drosophila* Sexual Selection
Faculty Mentor	Dr. Wyatt Anderson, Department of Genetics
Sharon A. McCoy	Dialect Perceptions of Spanish Speakers in Georgia
Faculty Mentor	Dr. Chad Howe, Department of Romance Languages
Amy M. McGoff & Harold Jackson	Polyphenolic Antioxidants in Unprocessed Traditional Diets: Wild-Crafted Acorn Flour as a Dietary Staple
Faculty Mentor	Dr. James Hargrove, Department of Food & Nutrition
David T. Mitchell	Effects of Social Environment on Women's Participation in Computer Science
Faculty Mentor	Dr. Victoria Plaut, Department of Psychology
Jessica L. Mobley	Is a Hepatitis E-Like Virus Found In Cats and Does It Cause Hepatitis?
Faculty Mentor	Dr. Elizabeth Howerth, Department of Pathology
Michael D. Mogill	Oxygen Delivery After Ischemia in Active and Inactive Subjects
Faculty Mentor	Dr. Kevin McCully, Department of Kinesiology
Prashant Monian	Expression of Glycerophospholipids in Rat Brain after Cocaine Withdrawal
Faculty Mentor	Dr. Brian Cummings, Department of Pharmaceutical & Biomedical Sciences
Diana Murro	Creation of a Transposon Library in *Francisella tularensis* Strain LVS
Faculty Mentor	Dr. Russell Karls, Department of Infectious Diseases
Neil D. Naik	Investigating the Role of Corticotrophin Releasing Factor 1 Receptors (CRFR1) in Stress-Induced Weight Loss
Faculty Mentor	Dr. Ruth Harris, Department of Food & Nutrition

Muktha S. Natrajan	The Role of KIT-Ligand in Enrichment and Differentiation of Germ-Like Cells in Human Embryonic Stem Cell Cultures
Faculty Mentor	Dr. Steven Stice, Department of Animal & Dairy Science
Natalie A. Nesmith	Genetic Studies on the Roles of KITL in Regulating Germ Cells in Mice
Faculty Mentor	Dr. Mary Bedell, Department of Genetics
William T. Oliver	The Effects of Alcohol Abuse on Antisaccade Performance
Faculty Mentor	Dr. Jennifer McDowell, Department of Psychology
Tulsi Patel	Development of a Biocontrol Agent for Chinese Privet, *Ligustrum sinense*
Faculty Mentor	Dr. Scott Gold, Department of Plant Pathology
Amanda C. Perofsky	Behavioral Effects of Navigate® on Paedomorphic Mole Salamanders, *Ambystoma talpoideum*
Faculty Mentor	Dr. John Maerz, Department of Wildlife
Tomas Pickering	Measuring Proficiency of Palm Nut (*Attalea sp.*) Cracking in Wild Bearded Capuchin Monkeys (*Cebus libidinosus*)
Faculty Mentor	Dr. Dorothy Fragaszy, Department of Psychology
Cleveland A. Piggott	The Role of Microtubules in the Formation and Degradation of Hirano Bodies
Faculty Mentors	Dr. Marcus Fechheimer, Department of Cellular Biology Dr. Ruth Furukawa, Department of Cellular Biology
Adam Pyrzak	Acidocalcisome-like Granules of Chicken Egg Yolk – Polyphosphate Content and Its Relationship to Development
Faculty Mentors	Dr. Roberto Docampo, Department of Cellular Biology, Center for Tropical and Emerging Global Diseases Dr. Paul Ulrich, Department of Cellular Biology, Center for Tropical and Emerging Global Diseases
Anita C. Randolph	Functionality of Glutamate Receptors in hESC-derived Neural Progenitors vs. Matured Neurons
Faculty Mentor	Dr. Steven Stice, Department of Animal & Dairy Science
Amanda N. Rinehart	Identity Achievement as a Function of Age, Gender, and Ethnicity
Faculty Mentors	Dr. Douglas Kleiber, Department of Counseling & Human Development Dr. Pedro Portes, Center for Latino Achievement & Success in Education
Jarrad W. Rowse	Understanding M16A Metalloprotease Enzymology
Faculty Mentor	Dr. Walter Schmidt, Department of Biochemistry & Molecular Biology

Julia R. Schuchard	Relationships Between Psychosis Risk Scales and Antisaccade Performance
Faculty Mentor	Dr. Jennifer McDowell, Department of Psychology
Jeff Shapiro	Effects of Initial Population Size and Food Quality on Stochastic Population Persistence
Faculty Mentor	Dr. John Drake, Eugene Odum School of Ecology
Edgar A. Shartilov	Functional Characterization of a Putative Inositol-1,4,5-Triphosphate Receptor in the Parasite *Trypanosoma brucei*
Faculty Mentors	Dr. Silvia Moreno, Department of Cellular Biology, Center for Tropical and Emerging Global Diseases Dr. Paul Ulrich, Department of Cellular Biology, Center for Tropical and Emerging Global Diseases
Lindsay T. Stein	The Distribution of Rabies Antigen by Immunohistochemistry in the Brains of Different Mammalian Species
Faculty Mentor	Dr. Corrie Brown, Department of Pathology
Yen Tran	Comparison of the Acute Toxicity of Selective Serotonin Reuptake Inhibitors (SSRIs) and St. John's Wort (*Hypericum perforatum*) to *Ceriodaphnia dubia*
Faculty Mentor	Dr. Marsha Black, Department of Environmental & Health Sciences
Kathryn L. Turner	RGS Regulation of the LPA Signaling Pathway in Prostate Cancer Cells
Faculty Mentor	Dr. Shelley Hooks, Department of Pharmaceutical & Biomedical Sciences
Matthew A. Turner	An Investigation of the Relationship between the Existence of Inc A/C Plasmids and the Prevalence of Multiple Therapeutic Antibiotic Resistances
Faculty Mentor	Dr. Susan Sanchez, Department of Pathology
Manouela V. Valtcheva	SPQ-Identified Schizotypy and Antisaccade Performance in a Normal Population
Faculty Mentor	Dr. Jennifer McDowell, Department of Psychology
Dana Wagshal	Source Memory and Picture Location in Relation to Working Memory
Faculty Mentor	Dr. Nash Unsworth, Department of Psychology
Wei Wang	Is Elevation of O-GlcNAc Levels Both Necessary and Sufficient to Extend Median Lifespan?
Faculty Mentor	Dr. Lance Wells, Department of Biochemistry & Molecular Biology

Aaron O. Watwood	Design Evolution of a Non-Electric Evaporative-Cooling Milk Container for Smallholder Farmers in East Africa
Faculty Mentor	Dr. William Kisaalita, Department of Biological & Agricultural Engineering

6:15 p.m. Art Gallery Talks

Classic Center, Fire Hall

Introductions	Dr. Pamela B. Kleiber, Associate Director, Honors Program Prof. Georgia Strange, Director, Lamar Dodd School of Art Ms. Nora Wendl, Gallery Director, Lamar Dodd School of Art

Visual Arts Presenters

Meghan Boling, Talia Bromstad, David Broughton, Kathryn Burne, Bryan Hilley, Corey Jameson, Lauren Kesler, Ivy Lane, Eric Lotzer, Katherine Osbum, Lauren Ramsey & Ivy Williams	*Collaborative Print Project: Prada Shoes*
Faculty Mentor	Prof. Shelly DiCello, Department of Printmaking
Gabrielle Bratton, Maddie Edwards & Miriam Rowe	*Project Runway: Consume*
Faculty Mentors	Prof. Clay McLaurin, Department of Fabric Design Prof. Mary Pearse, Department of Jewelry/Metalsmithing
Jenny Bryant, Julie Givens & Marilyn Zapf	*Project Runway: Cyborg*
Faculty Mentors	Prof. Clay McLaurin, Department of Fabric Design Prof. Mary Pearse, Department of Jewelry/Metalsmithing
Ashley Buchanan, Lindsey Bartell, Eleanor Simmons & Jenny Moore	*Project Runway: The Defense of Intimacy*
Faculty Mentors	Prof. Clay McLaurin, Department of Fabric Design Prof. Mary Pearse, Department of Jewelry/Metalsmithing
Adam Gruszynski	*The People* *The Tower* *Nancy*
Faculty Mentors	Prof. Ted Saupe, Department of Ceramics Prof. Sunkoo Yuh, Department of Ceramics
Kathleen Janvier	*Residue Brooch*
Faculty Mentor	Prof. Mary Pearse, Department of Jewelry/Metalsmithing

Lindsay MacLean Ruderman, Susan Kent & Rachel Huggins	*Project Runway: Untitled*
Faculty Mentors	Prof. Clay McLaurin, Department of Fabric Design Prof. Mary Pearse, Department of Jewelry/Metalsmithing
Marie Tetzlaff, Allison Sheats & Kathleen Janvier	*Project Runway: Screen Study*
Faculty Mentors	Prof. Clay McLaurin, Department of Fabric Design Prof. Mary Pearse, Department of Jewelry/Metalsmithing
Marilyn Zapf	*Simulacrum Ring*
Faculty Mentor	Prof. Robert Jackson, Department of Jewelry/Metalsmithing

Art exhibit arranged by Ms. Nora Wendl, Gallery Director, Lamar Dodd School of Art

8:00 p.m. Awards Ceremony

Classic Center, Fire Hall

Presentation of CURO Summer Research Fellows, CURO Scholars, UGA Libraries Undergraduate Research Awards, and Best Paper Awards	Dr. David S. Williams, Director, Honors Program Ms. Florence E. King, Assistant University Librarian for Human Resources and Director, Student Learning Center Ms. Deborah Dietzler, Executive Director, UGA Alumni Association

The office of the Senior Vice President for Academic Affairs and Provost and the Honors Program established the Excellence in Undergraduate Research Mentoring Award in 2001. This award recognizes faculty, departments, and programs devoted to outstanding research mentorship of undergraduate students. In 2006, the Graduate School and the Honors Program established a new award that recognizes graduate students devoted to the research mentorship of undergraduate students. Awards will be presented at the CURO Symposium Opening Session on Monday, March 31, 2008 at 4:00 p.m. in the Classic Center, Athena Ballroom E.

2008 Awards

Master Level Faculty Award
Dr. John J. Maurer, Professor of Population Health
Early Career Faculty Award
Dr. Walter K. Schmidt, Assistant Professor of Biochemistry & Molecular Biology
Program Award
Biomedical and Health Sciences Institute

2007 Awards

Master Level Faculty Award
Dr. Timothy Hoover, Associate Professor of Microbiology
Early Career Faculty Award
Dr. Steven Stice, Professor of Animal & Dairy Science

2006 Awards

Master Level Faculty Award
Dr. Patricia Hunt-Hurst, Associate Professor of Textiles, Merchandising & Interiors
Early Career Faculty Award
Dr. Rodney Mauricio, Professor of Genetics
Graduate Student Award
Christopher Anderson, PhD candidate in Ecology
Graduate Student Recognition
Dawn Holligan, PhD student in Plant Biology

2005 Awards

Faculty Awards
Dr. Gary Barrett, Odum Professor of Ecology
Dr. Sidney Kushner, Professor of Genetics
Department Award
Department of Cellular Biology

2004 Award

Faculty Award
Dr. William S. Kisaalita, Associate Professor of Biological & Agricultural Engineering

2003 Awards

Faculty Award
Dr. Jody Clay-Warner, Assistant Professor of Sociology

Department Award
Department of Microbiology
Dr. Duncan Krause, Department Head
Dr. Timothy Hoover, Undergraduate Coordinator

Program Award
The Pratt Laboratory of Plant Genomics and Bioinformatics
Dr. Lee H. Pratt, Professor
Dr. Marie-Michèle Cordonnier-Pratt, Senior Research Scientist

2002 Awards

Faculty Awards
Professor William D. Paul, Jr., Professor of Art
Dr. Katherine Kipp, Associate Professor of Psychology

Faculty Recognition
Dr. Susan Sanchez, Assistant Professor of Veterinary Medicine

Department Award
Department of Biochemistry & Molecular Biology
Dr. J. David Puett, Department Head

Program Award
"Physics Beyond the Boundaries": National Science Foundation, REU Program
Dr. Loris Magnani, Principal Investigator, Professor of Physics and Astronomy
Dr. Heinz-Bernd Schuttler, Professor and Department Head of Physics and Astronomy
Dr. Jonathan Arnold, Professor of Genetics
Dr. Susmita Datta, Professor, Georgia State University
Dr. David Logan, Professor, Clark Atlanta University
Dr. William Steffans, Professor, Clark Atlanta University

2001 Awards

Faculty Award
Dr. Marcus Fechheimer, Professor of Cellular Biology

Faculty Recognition
Dr. David MacIntosh, Associate Professor of Environmental Health Sciences
Dr. Dean Rojek, Associate Professor of Sociology

Department Award
Genetics Department
Dr. John MacDonald, Department Head and Professor

Program Award
Savannah River Ecology Laboratory
Dr. Paul Bertsch, Director

Graduate Student Reviewers for CURO 2008 Symposium

Michael Amlung	Psychology
Kate Brandon	Microbiology
Sarah Craven	Microbiology
Robert Crawford	Geology
John M. Davis	Ecology
Matt First	Marine Sciences
Leslie Green	Housing & Consumer Economics
Ivy Holliman	History
Carly Jordan	Cellular Biology
Lisa Kanizay	Plant Biology
Tyler Kartzinel	Ecology
Cynthia McMeekin	International Affairs
Marie Milward	Political Science
Rebecca Nordin	Educational Psychology & Instructional Technology
Sharon O'Kelley	Math Education
Tom Okie	History
Natalie Pope	Social Work
David Porcaro	Educational Psychology & Instructional Technology
Sarah Reiff	Cellular Biology
John Ronquillo	Public Administration & Policy
Chip Small	Ecology
James Tucker Swindell II	Biochemistry & Molecular Biology
Matt Tessier	Chemistry
Sarah Vess	Educational Psychology & Instructional Technology
Caroline Watson	Chemistry
Jennifer White	International Affairs

Reviewers for Best Paper Awards

Michael Amlung	Graduate Student, Psychology
Dr. Wyatt Anderson	Alumni Foundation Distinguished Professor, Genetics
Caroline Barratt	Reference Librarian, UGA Libraries
Dr. E. M. (Woody) Beck	Meigs Distinguished Teaching Professor, Sociology
Dr. Marcus Fechheimer	Meigs Distinguished Teaching Professor, Cellular Biology
Matt First	Graduate Student, Marine Sciences
Dr. Margaret Holt	Professor Emerita, Adult Education
Dr. Sylvia Hutchinson	Professor Emerita, Language & Literacy Education and Institute of Higher Education
Carly Jordan	Graduate Student, Cellular Biology
Dr. William Kisaalita	Professor, Biological & Agricultural Engineering
Sharon O'Kelley	Graduate Student, Math Education
Tom Okie	Graduate Student, History
James Tucker Swindell II	Graduate Student, Biochemistry & Molecular Biology
Dr. Fran Teague	Meigs Distinguished Teaching Professor, English
Matt Tessier	Graduate Student, Chemistry
Elizabeth White	Reference Librarian, UGA Libraries

Thanks and Acknowledgements

Reviewers for Excellence in Undergraduate Research Mentoring Awards

Dr. Josef M. Broder	Dean and D. W. Brooks Distinguished Professor of Agricultural & Applied Economics, College of Agricultural & Environmental Sciences
Dr. Timothy R. Hoover	Associate Department Head and Associate Professor, Microbiology, Franklin College of Arts & Sciences
Dr. Patricia Hunt-Hurst	Department Head and Professor, Textiles, Merchandising & Interiors, College of Family & Consumer Sciences
Dr. William Kisaalita	Professor, Biological & Agricultural Engineering, College of Agricultural & Environmental Sciences
Dr. Jody Clay-Warner	Associate Professor, Sociology, Franklin College of Arts & Sciences

Reviewers for CURO Summer Research Fellowships

Dr. E. M. (Woody) Beck	Meigs Distinguished Teaching Professor, Sociology
Dr. Gaylen Edwards	Professor, Physiology & Pharmacology
Dr. Paul Schroeder	Professor, Geology
Dr. Regina A. Smith	Associate Vice President for Research
Dr. Fran Teague	Meigs Distinguished Teaching Professor, English
Dr. Brahm Verma	Professor, Biological & Agricultural Engineering

CURO Advisory Board

Dr. Wyatt Anderson	Alumni Foundation Distinguished Professor, Genetics
Dr. E. M. (Woody) Beck	Meigs Distinguished Teaching Professor, Sociology
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Prof. Jere Morehead	Vice President for Instruction
Dr. David Saltz	Department Head and Associate Professor, Theatre & Film Studies
Dr. Susan Sanchez	Associate Professor, Athens Diagnostic Laboratory, College of Veterinary Medicine
Dr. Fausto Sarmiento	Assistant Professor, Geography
Dr. Steven Stice	Senior Research Scientist and Associate Professor, Animal & Dairy Science
Dr. Katharina Wilson	Professor, Comparative Literature
Adele Handy	Undergraduate Student, Biology and Psychology
Courtney Thomas	Undergraduate Student, English

Ex Officio

Dr. David S. Williams	Director of the Honors Program, Foundation Fellows, and CURO
Dr. Pamela B. Kleiber	Associate Director of the Honors Program and CURO

CURO Gateway Seminar Faculty

Prof. Mark Callahan	Ideas for Creative Expression (ICE)
Dr. Ron Carroll	Ecology
Dr. Kathleen DeMarrais	Social Science Education
Dr. Joseph Dominick, Jr.	Journalism
Dr. William Eiland	Art History
Dr. Marcus Fechheimer	Cellular Biology
Dr. Maryann P. Feldman	Institute of Higher Education
Dr. Joe Fu	Mathematics
Dr. Katarzyna Jerzak	Comparative Literature
Dr. Pamela B. Kleiber	Honors Program and CURO
Dr. Elizabeth Kraft	English
Dr. Marc L. Lipson	International Business
Dr. Tricia Lootens	English
Dr. Larry Nackerud	Social Work
Dr. Jeffry Netter	Banking and Finance
Dr. Rosemary Phelps	Counseling Psychology and Human Services
Dr. David Porter	Botany
Dr. Dean Rojek	Sociology
Dr. Paul A. Schroeder	Geology
Dr. Scott Shamp	Telecommunications
Dr. Sheila Slaughter	Institute of Higher Education
Dr. Michael Terns	Biochemistry and Molecular Biology
Dr. Kecia Thomas	Psychology
Dr. Scott L. Thomas	Institute of Higher Education
Dr. Katharina Wilson	Comparative Literature

Aggressive Behavior and Prezygotic Isolation in *Drosophila persimilis* and *D. pseudoobscura*

Kyle F. Abramowicz
Dr. Wyatt Anderson, Department of Genetics, University of Georgia

The two species *Drosophila persimilis* and *Drosophila pseudoobscura* are ideal models for the study of speciation. They are of particular interest because of their natural distribution - the range of *D. persimilis* is entirely within that of *D. pseudoobscura*. Sympatric speciation is a divergence in the same geographic area, whereas allopatric speciation involves a geographic separation. In this experiment, aggressive behaviors of different *Drosophila* strains were observed to investigate the possible effects of aggressive behavior on the sympatric speciation of *D. persimilis*. An acrylic variant of Elens-Wattieau mating chambers were used to observe *D. persimilis* paired with *D. pseudoobscura* from populations that exist naturally in sympatry or allopatry with *D. persimilis*. Six aggressive behaviors were observed - wing threat, fencing, lunging, boxing, holding, and chasing. Aggressive behavior was totaled for each encounter. Means and standard errors were calculated and analyzed for significance. The collected data showed a significantly higher incidence of aggressive behavior in *D. persimilis* when paired with the allopatric strain of *D. pseudoobscura*. There were no meaningful differences in aggressive behavior between the two strains of *D. pseudoobscura*. The higher aggressive behavior observed in the allopatric pairing indicates that while aggressive behavior is not a significant source of prezygotic isolation in sympatric populations, it is impacted to greater levels in allopatry. A possible cause is that there is a cost to aggressive behavior, thus reducing the fitness of constantly aggressive individuals. Further studies on the interacting behavior of closely-related species may reveal a behavioral influence on speciation.

Epistasis for Fitness among Biosynthesis Genes in Yeast

Matthew C. Agan, CURO Scholar
Dr. David Hall, Department of Genetics, University of Georgia

Understanding the evolution of sexual reproduction is a central question in evolutionary biology. Deleterious mutations play an important role in theories for the evolution of sex. Specifically, if different deleterious mutations interact so that their combined effect is greater than the sum of their individual effects, sexual reproduction is more likely to evolve. This phenomenon is termed synergistic epistasis. I generated yeast strains with all possible combinations of six different mutations (zero mutations, six different single mutations, etc.) and scored their fitness to test for evidence of synergistic epistasis. The results and analysis of patterns of fitness from four different tests will be presented: haploid mating efficiency, diploid sporulation efficiency, and both haploid and diploid growth rate. Each test will estimate the fitness of every genotype using a different component of fitness, so that all four together will encompass the entire life cycle of the yeast. Evidence of synergistic epistasis in any of the assays would provide support for current theories for the evolution of sexual reproduction

A Psychological View of Wolf/ Mörike's Peregrina Songs

Caroline M. Anderson, CURO Summer Fellow, CURO Scholar
Dr. Max Reinhart, Department of Germanic & Slavic Languages, University of Georgia

Hugo Wolf's (1860-1903) and Eduard Mörike's (1804-1875) Peregrina I and II (1888) are songs rich in harmonic and rhythmic complexities that do not always hold a clear relationship with the texts. Unfortunately, the considerable body of scholarship on German art songs has generally taken an analytical approach that focuses primarily on texts. As a result, the musical layers of these songs are often only explored superficially. Deborah Stein and Susan Youens are the only scholars to come close to touching

on the issue of psychological distress and tension within these art songs, though her research is still limited to minimal songs. My research incorporates a combination of text analysis, music theory, and psychology; this approach in particular allows one to more closely examine the relationship between the text, which represents the conscious mind, and the music, which represents the subconscious mind. The established literature does cover the basics of art songs by discussing musical symbolism and mood representation, but Wolf's choice to portray the deeper meaning of the poem, rather than the surface value, is scarcely discussed. Through my research, I realized that two areas of conflict are within the songs; the struggle between fantasy and reality, and desire for love and the disappointment that ensued, the latter being very personal for Mörike. The conflicts result in a shift of functionality of the underlying harmonies, in which the nature of harmonic function is a psychological parallel to the text. The harmonic shift is therefore a reflection of the conflicts. The musical representation of developing insanity is that of unusual chord inversions and desires is represented by jarring syncopation. With these findings, I provide a new model for analyzing the German art song tradition that allows for a greater understanding of the interaction between the music and text.

The Influence of Family Structure on Aggression Displayed in Young Head Start Children

Matthew G. Anderson, Lindsay Bailey, Christopher Newberry, and Jimmie Flower
Dr Tsu-Ming Chiang, Department of Psychology, Georgia College & State University

Current research of childhood aggression has shown significant relationships exist between the quality of mother-child relationships and their children's external aggression. However, the majority of these studies of childhood aggression were limited to study how aggression is displayed in middle class families. Few studies examined the influence of social variables, such as lower social economic status and/or single parent background, have on children's aggression. The need to examine how diverse family dynamics are related to children's social development is evident. The present study thus designed to examine the relationship between the reported parental child-rearing beliefs and their children's aggressive behaviors observed in the classroom from a local head start program. Many children in these samples do not have residential fathers. Some children even frequently lack any paternal guardian. Fifty two children with ages range from 35 months to 48 months old in two waves of data were used to document how various types of demographic background related to children's displays of aggressive behaviors. Guardians of these children were asked to fill out a survey (Chiang, 2006) regarding their observations of children's hurting and helping behaviors and disciplinary practices. Teachers were given Social Competence Behavior Evaluations (by LaFreniere) to rate children's social behaviors in school. Although children from single parent households did not show more aggressive behaviors, children from father present families tend to have better social skills. Further results and implications will be discussed at the conference to address whether children are universally better with two parents in social development.

The Engineering Learning Environment

Ashley A. Babcock
Dr. Nadia Kellam, Department of Biological & Agricultural Engineering, University of Georgia

Previous studies have indicated that the engineering learning environment strongly influences a lack of diversity among students as well as harboring a "chilly" environment for students, both male and female. This "chilly" environment harbors competitiveness, loneliness, and separation of students and professors, culminating in the limited spectrum of surviving students, particularly females, who comprise only 20% of those who graduate. While there is much literature focusing on learning environments, little has been directly extended to the engineering learning

environment and its impact on women. Because the learning environment can empower or marginalize people, this research aims to not only understand the learning environment but also the connection between the learning environment and attraction and retention of diverse people, specifically women. A set of semi-structured interviews employ biographic and linguistic analysis methodologies to elicit female students' accounts of their learning environment in engineering. The interview questions elicit narratives from the female students describing their decision to major in engineering, a typical day in the classroom, the topics in their courses, the building's aesthetics, and any reluctance to continue in engineering. Qualitative research methodologies are used to elicit greater, contextual understanding of women's experiences since quantitative research tends toward marginalization of subjects, seeking broad generalizations. These accounts highlight environmental attributes and detriments, indicating that the engineering learning environment is "chilly." Graduate-bound students indicate that their success is accredited to support groups via club involvement and undergraduate research that helped dissipate this "chilly" environment.

Examining Parenting Stress for Mothers of Young Children with Autism Spectrum Disorders

Jennifer L. Barr
Dr. Jonathon Campbell, Department of Education Psychology & Institutional Technology, University of Georgia

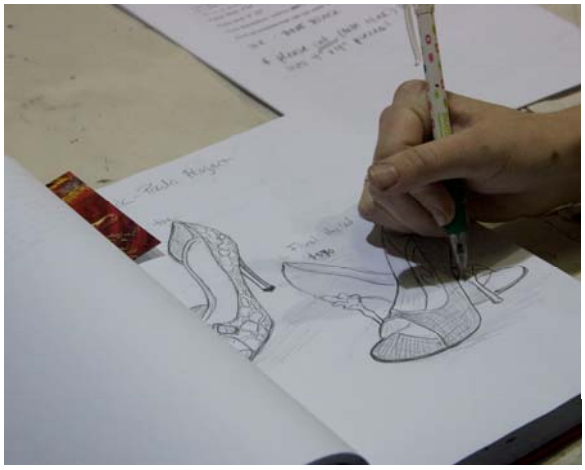
Parents of children with an Autism Spectrum Disorder (ASD) report higher stress levels than parents of typically developing children and parents of children with Down syndrome. Research has shown that parents of children with ASD attribute the highest degree of parenting stress to their child's: embarrassing disruptive behavior, lack of prosocial behaviors, and inability to function independently. This study examined Parenting Stress Index (PSI) scores of six families with children with ASDs (50% male, M = 4 years, 2 months) participating in the Parent-Child Interaction Therapy (PCIT) Clinic at the University of Georgia. Participant PSI scores were compared to literature documenting specific stress profiles of parents of children with ASDs. Based on the published literature, the author predicts that parents of children with ASDs will score higher on certain subscales of the PSI. In the child domain, participants should score highest on the distractibility/hyperactivity, reinforces parent, and acceptability subscales. In the parent domain, participants are predicted to score highest on attachment, role restriction, and depression. Further, recommendations will be made as to whether PSI Total Stress scores or PSI subscale scores should be utilized when examining the effect of treatment on parenting stress in families of children with ASD.

Can Smallholder Dairy Farmers of Southwestern Uganda Save Their Evening Milk?

Robert D. Bennett
Dr. William Kisaalita, Department of Biological & Agricultural Engineering, University of Georgia

Due to the poor infrastructure of the milk trade of Uganda, smallholder dairy farmers of Southwestern Uganda have no way of selling the evening milk which constitutes thirty-five percent of the total milk harvested. A cooler is being created to save this milk until it can be taken to market the following morning; however, it still stands to be determined if the cost of the design can be repaid by the farmer. The purpose of this paper is to determine the affordable cost of the cooler to guide the design and fabrication processes. The average smallholder farmer has 5 cows which produce a total of 50 liters of milk daily, 17.5 liters of which are produced in the evening. The current market price for the farmer is 200 Uganda Shillings (USh) per liter while the cooler design currently costs 170,000 USh. It will be shown that there is need for the manufactured cost to be lowered to allow the farmer to repay the initial cost in two years. However, expeditious repayment is shown to be a possibility with the supplement in income that the evening milk

provides. Also, the above calculation is considered conservative; it is speculated that the current price of milk will rise due to demand rising as the infrastructure of transporting and storing processed milk, which is relatively new in Uganda, becomes refined. With a rise in price and therefore profits for the farmer, the repayment period would be shortened allowing more farmers to obtain the product without a debilitating debt.



Collaborative Print Project: Prada Shoes
Meghan Boling, Talia Bromstad, David Broughton, Kathryn Burne, Bryan Hilley, Corey Jameson, Lauren Kesler, Ivy Lane, Eric Lotzer, Katherine Osbum, Lauren Ramsey & Ivy Williams
Prof. Shelly DiCello, Department of Printmaking, University of Georgia

In this collaborative project, Lamar Dodd School of Art Visiting Assistant Professor Shelly DiCello, Visiting Artist Libby Black, and twenty undergraduate, graduate and faculty artists (selected by artist Libby Black after an application process) each created a print corresponding to a narrative penned by Black, "Prada Shoes." The parameters of the project asked that each participant draw and etch a pair of Prada shoes that they desire to own. Each participant then created an edition of 25 prints from their matrix, as well as one paper box that housed this portfolio.

The Role of Rif1 in *Kluyveromyces lactis* Telomere Maintenance
Andrew D. Bosson, CURO Scholar
Dr. Michael McEachern, Department of Genetics

Linear chromosomes present two major problems to a cell. The first is that every round of replication slightly shortens the chromosome ends because initiation requires a primer, and the second is that the ends can be confused with damaged DNA and therefore be degraded by the cell. To prevent the loss of genetic information at the chromosome terminus during each round of replication, eukaryotic chromosomes have structures on their ends, called telomeres, consisting of multiple repeats of a short non-coding DNA sequence capped with telomeric proteins. The enzyme telomerase maintains the functional telomeric structure by adding more DNA repeats when the telomeres get too short. Since most adult human somatic cells do not need to divide any more, they do not express telomerase, and replication eventually leads to senescence. In most carcinogenic cells, however, telomerase is expressed at high levels, allowing the cells to divide indefinitely. Basic knowledge of telomerase and telomerase-related proteins is therefore of great importance to cancer research. This project details the involvement in telomere maintenance of a telomerase-associated protein, Rif1, in the model yeast *Kluyveromyces lactis*. Rif1 knockout mutants were grown in different genetic backgrounds and analyzed for phenotypic effects, including telomere length, in order to determine how Rif1 affects telomerase activity and the capping of telomeres. The results of this study provide a better understanding of the function of Rif1 on the telomerase complex and the alternative telomere elongation process of recombination.

Are We Really Ready? The Need for National Standards and the Creation of the Cycle of Emergency Planning

Ashley A. Bowen, Roosevelt @ UGA
Dr. Brock Tessman, Department of International Affairs, University of Georgia

After witnessing the September 11th attacks and the aftermath of Hurricane Katrina, Americans have become increasingly concerned about the safety and security of the United States. A review of the Department of Homeland Security's (DHS) policies and recent performance reveals major weaknesses in the nation's preparedness for protecting against and responding to terrorist attacks and natural disasters. Research has shown that the DHS currently lacks any national standards for the review and maintenance of emergency plans, the frequency of emergency drills, and the review of results from such drills. This policy proposes the standardization of emergency exercises across the nation and the creation of the Cycle of Emergency Planning (CEP), with DHS funding contingent on the implementation of these national standards. This paper addresses how the implementation of the CEP would provide a method for testing, revising, and maintaining emergency preparedness through review, exercises, and revision. The CEP is designed to resolve many of the current breakdowns in planning at the state and local level. Holding emergency exercises at least every two years and reviewing their results will help keep plans current and grounded in feasibility. Reviews of emergency plans and capabilities, conducted every five years by a third party, will help maintain objectivity in the reviewing process. These exercises and reviews should be used to update and maintain emergency plans as part of the CEP. Enforcing these new standards will remedy the failures in the current emergency preparedness system and improve the general safety and security of the nation.

Project Runway: Consume

Gabrielle Bratton, Maddie Edwards & Miriam Rowe
Prof. Clay McLaurin, Department of Fabric Design, University of Georgia
Prof. Mary Pearse, Department of Jewelry/Metalsmithing, University of Georgia

In this collaborative project and runway exhibition by Jewelry/Metalsmithing students of Professor Mary Pearse and Fibers students of Professor Clay McLaurin, material, adornment and body as site are examined and performed, taking cues from Visiting Artist Anya Kivarkis, and the publication "Fashion at the Edge." For one week, these students worked in teams of five with non-traditional materials, manipulating paper towels, hosiery, window screening and roofing shingles into performative, and in some cases spectacular, wearable art.

This piece explores the concept of restriction. We chose physically light weight materials,

nylon and polyester batting, to create the illusion of something heavy that would weigh down the body. The decision to use nylons was also important because nylons are physically restrictive to the body. We wanted this piece to restrict the body's movement both by adding weight and tension.

Materials: Paper, cupcake liners, paper towels

Towards the Discovery of Ras-Converting Enzyme Inhibitors - A Novel Anti-Cancer Target

Sarah R. Breevoort, CURO Scholar
Dr. Walter Schmidt, Department of Biochemistry & Molecular Biology, University of Georgia

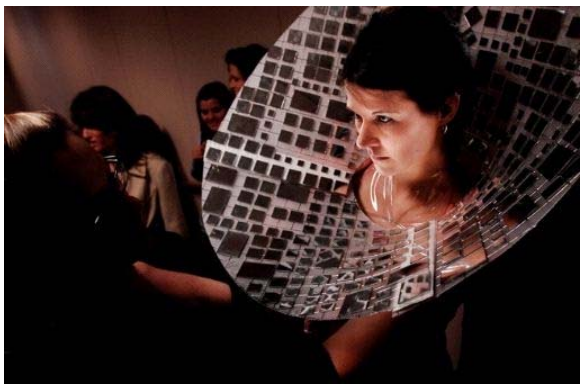
The proteases Rce1p and Ste24p promote a proteolytic step associated with the maturation of proteins containing a C-terminally localized *CaaX* motif, (*C* = cysteine, *a* = small aliphatic amino acid, *X* = one of several amino acids). Rce1p is considered a chemotherapeutic target because of its crucial role in the maturation of Ras proteins. Hyperactive forms of Ras are associated with 30% of human cancer tumors, including more than 90% of pancreatic cancers and 50% of lung cancers. Inhibiting Ras maturation is proposed to disable, or at least moderate, its cancer-causing activity. Because of the critical role Rce1p has in Ras maturation, compounds that inhibit Rce1p are being considered as anti-cancer therapeutics. In this study we compared the inhibitory profiles of the Rce1p and Ste24p *CaaX* proteases using peptidyl(acyloxy) methyl ketones (AOMKs) and inhibitors identified by high throughput screening (HTS). We conclude that AOMKs, although displaying better inhibitory properties than certain previously reported Rce1p inhibitors, are unlikely therapeutic candidates partially because of the inability to significantly enhance their potency. Nevertheless, we did observe instances of selectivity among the *CaaX* proteases, which makes these compounds effective tools for investigating *CaaX* protease enzymology. The inhibitory profiles of compounds identified by HTS and their analogs were also evaluated, and several compounds appear to be potent and specific Rce1p inhibitors. The compounds identified represent new tools for understanding the enzymology of post-isoprenylation modifying enzymes and provide new insight for the future development of Rce1p inhibitors that could be developed as anti-cancer drugs.

Forced Copulation and Offspring Viability in *Drosophila melanogaster*

Emily Dale Broder, CURO Scholar
Dr. Wyatt Anderson, Department of Genetics, University of Georgia
Dr. Yong-Kyu Kim, Department of Genetics, University of Georgia

The compensation hypothesis predicts that males and females mated with non-preferred partners attempt to make up for viability deficits in their surviving offspring by increasing reproductive investment. Consistent with the hypothesis of reproductive compensation, previous studies show that fewer offspring resulted from non-preferred matings in *Drosophila pseudoobscura* though males transferred more sperm when constrained to mate with a non-preferred partner. Using *Drosophila melanogaster*, I tested the compensation hypothesis by measuring offspring viability when females were constrained to mate with non-preferred partners. I employed natural phenomenon to create non-preferred matings: forced copulation and familiarity. Mature males forcibly copulate teneral females (very young immature flies) in nature. Following protocols from previous studies, I placed teneral females in vials with two mature males, but I observed no matings in over 60 trials. In previous experiments, flies avoided mating with each other when either non-siblings or siblings were raised together (familiarity); therefore matings between non-siblings raised together in the same vial are considered non-preferred. I raised non-siblings together in the same environment and crossed mature flies under one of two treatments: non-siblings raised together (NSRT) or non-siblings raised apart (NSRA). Fecundity and fertility will be a measured for offspring viability. Preferred

matings (NSRA) and non-preferred matings (NSRT) will be compared to test the compensation hypothesis. I expect matings between NSRT to yield more eggs but an equal number of offspring as NSRA. The results of these experiments will shed light on the components of reproduction that underline natural selection.



Project Runway: Cyborg
Jenny Bryant, Julie Givens & Marilyn Zapf
Prof. Clay McLaurin, Department of Fabric Design, University of Georgia
Prof. Mary Pearse, Department of Jewelry/Metalsmithing, University of Georgia

In this collaborative project and runway exhibition by Jewelry/Metalsmithing students of Professor Mary Pearse and Fibers students of Professor Clay McLaurin, material, adornment and body as site are examined and performed, taking cues from Visiting Artist Anya Kivarkis, and the publication "Fashion at the Edge." For one week, these students worked in teams of five with non-traditional materials, manipulating paper towels, hosiery, window screening and roofing shingles into performative, and in some cases spectacular, wearable art.

In our age of cyber-technology, identity and personality can exist apart from the body. Is it the moral nature of our bodies that drive us to create potentially immortal and forever youthful online personas, or is it technology that is suffocating our physical presence? As our minds become more disconnected from our body, will the current hybrid nature of technology and humanity remain? "Cyborg" questions the function of the body in this transitional time of being "plugged-in."

Materials: Electrical Cord, Mirror, Plastic, Vellum

"I Want My Credits!": The Impact of Procedural and Interactional Injustice on Participants' Evaluations of an Experimenter
Nancy D. Brynteson
Dr Alicia Bembenek, Department of Psychology, Georgia College & State University

It is difficult to determine precisely how a person may react when one experiences an injustice. Theory states that people will react negatively to any occurrence of injustice; however, a person experiencing an injustice may react differently depending upon the type of injustice experienced (e.g., procedural or interactional). This study was conducted to determine how participants would react to an experimenter who committed a procedural and/or interactional injustice against them. Undergraduates (N = 37) were provided with a cover story that they were completing a "student lifestyle" survey for research credit. Prior to the survey being completed, some participants experienced an interactional injustice (represented by a disrespectful, unrelated phone call made by the experimenter during the session). After the survey was completed some participants experienced a procedural injustice (represented by denial of research credit). Responses to the injustices were thereafter obtained with an "experimenter evaluation" which measured participants' thoughts (e.g., perceptions of respect), feelings (e.g., anger, disappointment), and behaviors (e.g., intentions to participate again with same experimenter) on 1 = *not at all* to 10 = *very much* scales. The results indicated that participants did perceive both types of injustices as unfair. However, participants responded negatively only after the procedural injustice was committed (i.e., when they were denied research credit), and did not appear to be affected by the interactional injustice (i.e., the inappropriate phone call).

Questions remain as to whether a non-student population would react similarly, as reactions to an injustice may depend strongly on *expectations* of social interactions.

Project Runway: The Defense of Intimacy
Ashley Buchanan, Lindsey Bartell, Eleanor Simmons & Jenny Moore
Prof. Clay McLaurin, Department of Fabric Design, University of Georgia
Prof. Mary Pearse, Department of Jewelry/Metalsmithing, University of Georgia

In this collaborative project and runway exhibition by Jewelry/Metalsmithing students of Professor Mary Pearse and Fibers students of Professor Clay McLaurin, material, adornment and body as site are examined and performed, taking cues from Visiting Artist Anya Kivarkis, and the publication "Fashion at the Edge." For one week, these students worked in teams of five with non-traditional materials, manipulating paper towels, hosiery, window screening and roofing shingles into performative, and in some cases spectacular, wearable art.

The Defense of Intimacy deals with an individual's prerogative to protect the aspects with which they feel most uncomfortable. By juxtaposing a hard, coarse outer shell with a pure, soft, and tactile interior the wearer can choose how she wishes to express her vulnerability.

Materials: Textured Poster Board, Satin, Organza, Yard Tubing

Charcoal-Powered Vacuum-Zeolite Adsorption Cooler Regenerator for the Preservation of Milk, Vaccines, and Other Perishables
Jessica L. Buday
Dr. William Kisaalita, Department of Biological & Agricultural Engineering, University of Georgia

Smallholder dairy farmers in Sub-Saharan Africa are not able to sell their evening milk to dairy processing centers because of the lack of appropriate equipment and electricity sources to cool the milk during transport. Through another undergraduate engineering design and research program, a cooler previously designed for alcoholic beverages (CoolKeg) is being adapted to meet this need. The cooler uses a vacuum-zeolite adsorption system and requires no electricity, but it is necessary to recharge it after each use by using heat exposure to regenerate the wet zeolite. The goal of this research is to develop a system that has the capacity to effectively "recharge" the cooler by regenerating (water desorption) the spent zeolite. A charcoal-powered brick oven has been designed using locally-available materials. The CoolKeg was filled with water to act as a milk-substitute, and a cooling curve was generated after every regeneration to indirectly assess the effectiveness of the oven and the stability of the zeolite. Preliminary results presented in terms of Coefficient of Performance (COP) approach those achieved in refrigeration devices employing similar technology, suggesting that

there is room for further optimization of the regeneration process. The success of this project is expected to have impact beyond milk; other preservation applications include vaccines and perishables such as non-alcoholic beverages.

Contemporary Brass Sounds
Bulldog Brass Quintet
Prof. Fred Mills, Director and Department of Academic & Performance Areas (Brass), University of Georgia

If J.S. Bach were alive today, he would love the sound of modern brass playing his compositions. The evolution and development of brass instruments over the last 150 years infuses 21st-century performances of Bach's 18th-century compositions with new life—a new set of clothes, so to speak. It is exciting to hear centuries-old masterworks performed in new styles to reach a modern audience. It is also exciting that American musical styles—jazz, country and western, bluegrass, and rock—have also donned new clothes and are welcomed into concert halls traditionally reserved for serious music of the 18th and 19th centuries. For the CURO Symposium, the Bulldog Brass Quintet will present a selection of "crossover" music—a phenomenon started in the 1960s by Jean-Pierre Rampal, Maurice André, and Itzhak Perlman and continued today by Mark O'Connor and Béla Fleck.

Tommy Cox, Trombone
Josh Cutchin, Tuba
Cathy Kilroe-Smith, Horn
Chris Probst, Trumpet
Aaron Ritter, Trumpet Solo
Brad Whitfield, Trumpet

Characterization of Mitoferrin and Its Interactions with Ferrochelatase
Joseph S. Burch, CURO Summer Fellow, CURO Scholar
Dr. Harry Dailey, Biomedical & Health Sciences Institute, University of Georgia

Iron is an important cofactor in many biological reactions. Due to its high redox nature, iron availability is highly regulated. Heme synthesis requires iron and is essential for life in almost all organisms. Iron is inserted in protoporphyrin IX during the last step of the heme biosynthesis pathway by ferrochelatase. Since ferrochelatase is associated with the inner-mitochondrial membrane, mitoferrin transports iron into the mitochondria. Little is known about mitoferrin except that it is membrane bound and it is necessary for erythroid iron assimilation into the mitochondria. The goal of this project was to clone, express, purify, and describe different mitoferrin orthologs and any interaction between mitoferrin and ferrochelatase. Five different mitoferrins genes have been isolated: zebra fish mitoferrin 1 (Z1), zebra fish mitoferrin 2 (Z2), human mitoferrin 1(H1), mouse mitoferrin 1 (M1), and mouse mitoferrin 2 (M2). Thus far, Z1, Z2, H1, and M2 have been cloned into multiple vectors and been expressed in *Escherichia coli*. Talon chromatography was used for purification and western analysis for detection. Small amounts of Z1, H1, and M2 have been detected with western blots. The small quantity of protein has limited further study. Immunoprecipitation reactions with mitoferrin and ferrochelatase have been inconclusive and failed to show any interaction. In further tests, Z1, H1, and M2 will be cloned into a modified pET vector which may provide better yields. With higher yields of the mitoferrins, an interaction between it and ferrochelatase may be shown.

Transcriptional Expression of *Arabidopsis* GAUT Genes: 15 Proven and Putative Plant Cell Wall Biosynthetic Galacturonosyltransferases
Amy J. Burrell, CURO Summer Fellow, CURO Scholar
Dr. Debra Mohnen, Complex Carbohydrate Research Center, University of Georgia

Pectin is a family of plant cell wall polysaccharides that have multiple functions in growth and development and are used for diverse industrial and biomedical products. A family of pectin biosynthetic enzymes known as galacturonosyltransferases catalyze the transfer

of galactosyluronic acid (GalA) residues from uridine diphosphate-GalA to growing polysaccharide chains. The first gene encoding a pectin galacturonosyltransferase, *Arabidopsis thaliana* GAlactUronosylTransferase1 (GAUT1), was recently identified. BLAST analyses indicate the existence of 14 additional genes (GAUTs 2-15) with sequence similarity to GAUT1. To understand the biological significance of these genes in pectin synthesis, it is important to understand where and when the genes are expressed. My research goal was to analyze the expression of each GAUT gene in *Arabidopsis* through utilization of a β-Glucuronidase (GUS) reporter gene system. The promoter regions of 13 GAUT genes were determined, amplified, and inserted into cloning vectors. The DNA sequence of the 13 promoter sequences were verified and the remaining two promoter sequences will be amplified soon. Using restriction digestion, the promoter regions of GAUT1 and GAUT7 were removed from the cloning vectors and inserted upstream of the GUS gene in a transformation vector. The GAUT1 and 7 promoter:GUS constructs were transformed into *Arabidopsis* plants using an *Agrobacterium*-mediated method. Transformed plants have been recovered and histochemically stained to detect GUS activity. The results indicating the cell-type and tissue-specific expression of the GAUT1 and GAUT7 genes will be reported and discussed in relation to the functions of the GAUT genes in pectin synthesis.

Emotional and Behavioral Problems Displayed in Preschoolers Raised by Biological Grandparents

Shelby R. Carlson, Holly Chandler, Heather Smith, Rebecca Lewis
Dr. Tsu-Ming Chiang, Department of Psychology, Georgia College & State University

Grandparents often assume the responsibility of raising their grandchildren, commonly to avoid placing children in foster care. There is an increasing 3.6 million grandchildren under the age of 18 being raised by grandparents in the United States. Children raised by grandparents tend to display more problematic emotional and behavioral development. The most common reason for children to be placed in the care of grandparents has been found to be drug use. Stressful events leading up to the transition of living with grandparents and the transition itself contributed to many emotional fluctuations in the child. Solomon and Marx (1995) found that children raised nontraditionally by grandparents are less successful in school than the children of the traditional, two-parent family. The present study examines a focus group of fifty-two 3-year old and 4-year old preschoolers with emotional and behavioral issues that were collected in a larger intervention study. Guardians of these children were given a parenting survey, and teachers were asked to rate these children's behaviors at school using Social Emotional Behavior Evaluation (SCBE, by LaFreniere). From the data, five returned surveys were from grandparents. The results showed grandparents reported that children less frequently engaged in hurting and aggressive behaviors. However, they were observed to display more disruptive behaviors in class. All five children were the youngest child in the family, with two children being the only child. Therefore, the results can be interpreted in various ways. Detailed results from these cases and their implications will be discussed.

Otavaleños and Cotacacheños: Local Perceptions of Sacred Sites for Farmscape Conservation in Highland Ecuador

Lee Ellen Carter, CURO Summer Fellow, CURO Scholar
Dr. Fausto Sarmiento, Department of Geography, University of Georgia

Indigenous communities around the world are facing pressure from tourism practices. Otavalo, Ecuador, provides one example of how local spiritual values can enhance the conservation efforts of ecotourism. The Imbakucha watershed includes mountain landscapes that numerous indigenous communities hold sacred. In this case, the increased pressure of globalization affects local natural, cultural, and economic values as the watershed undergoes a shift from

traditional to contemporary ecotourism practices. Through ethnographic and qualitative research, the study investigates the relationship between the indigenous people and their sacred land, by way of local understanding of identity and cultural values. The data was collected through 30 interviews conducted with indigenous community leaders, indigenous peoples, nonprofit organization workers, government officials, and academics in Quito, Otavalo, and Cotacachi, Ecuador. The study concludes that there is a general outlook among the interviewees that a stronger influence of environmental ideals can and should be instilled into the livelihood of indigenous communities, in order to promote sacred sites' conservation. We recommend the implementation of a Sacred Site conservation category with six principles, including: recognizing sacred natural sites; integrating these sites into protected area management; promoting participation, inclusion, and collaboration in the community; encouraging improved knowledge of sacred natural sites; protecting sacred natural sites with appropriate management access and use; and respecting the rights of sacred natural sites in national policy. These principles would allow the indigenous communities to preserve their ancestral beliefs and values, while also providing an economic influx through ecotourism.

Improving the Health of Georgia Youth: An Incentive Program for Nutritional Standards in Georgia Schools

Kevin K. Chang, Roosevelt @ UGA
Dr. Phaedra Corso, Department of Health Administration, Biostatistics & Epidemiology, University of Georgia

Since 1980, the prevalence of overweight among children in the United States has tripled. A recent 2007 report identifies the state of Georgia as having the twelfth highest rate of overweight youth in the United States. In Georgia's nearly 2700 schools, there are currently no nutritional standards for competitive foods, or foods sold outside the federal school meal programs, such as food items from vending machines. Furthermore, Georgia does not require higher nutritional standards than the federal requirements in breakfast and lunches, resulting in only minimal amounts of healthy foods in a student's diet. In order to improve the overall health of Georgia's youth, Georgia's Department of Education should offer an incentive program for all elementary and secondary schools currently lacking nutritional standards. Through a supplemental state reimbursement offered to schools that implement the standards, the program encourages schools to adopt nutritional standards for all competitive foods sold during the school day. These standards include limitations on calories and fat, sugar, sodium, and caffeine content. Schools participating in the program must also provide greater fruit and vegetable options during meal times. Participating schools will receive an increased reimbursement rate for each lunch served through the National School Lunch Program. The state can sustain funding for the program through a special state tax on foods of minimal nutritional value and foods deemed "unhealthy." Allowing schools to phase in implementations over a three-year period, the program promotes a sustained and practical effort in improving the health of Georgia's youth.

Evaluating Protocols for Measuring Immune Defenses in Larval Monarch Butterflies

Jean Chi
Dr. Sonia Altizer, Eugene Odum School of Ecology, University of Georgia

Insects are known to employ various immune defenses to protect against injuries and infections. Hemocytes are insect immune cells that differentiate into granulocytes, plasmatocytes, spheroid cells and oenocytoids. They respond to foreign invasive organisms through a wide range of mechanisms, including encapsulation and phagocytosis. Additionally, infection and injury activate a phenoloxidase (PO) enzyme cascade that produces the compound melanin, which binds to foreign bodies. A study system of monarch butterfly larvae (*Danaus plexippus*) was used to evaluate

and refine current protocols of measuring these two types of defenses by comparing different methods for hemocyte collection, and to investigate the relationship between PO activity, hemocyte counts, and the proportion of differentiated cells to establish baseline values for healthy monarch individuals. Results show that the two methods for collecting hemocytes produced different hemocyte counts, and also show positive correlations between PO activity and hemocyte counts. This study demonstrates that consistent methods for hemocyte collection are necessary for accurate counts, and validates techniques used in studies of monarch immune system responses to infections and environmental stress.

Managing U.S. Aid to Egypt: A Reorientation of Current Support

Chris Chiego, Roosevelt @ UGA
Dr. Brock Tessman, Department of International Affairs, University of Georgia

The Middle East region (excluding Iraq) receives the largest share of the United States' foreign aid at an estimated 38 percent annually. Since 1979, Congress has sent approximately 2 billion dollars a year to Egypt, placing Egypt second only to Israel in total foreign aid. Currently, Congress allocates the majority of aid ($1.3 billion) for military purposes and $500 million earmarked for economic aid, though both allocations are essentially unsupervised. With political change looming on the horizon and discontent rising within Egypt, the United States must shift its foreign aid to help ensure Egypt's long-term stability through economic prosperity and political moderation. This paper assesses the current state of Egypt using economic data, current academic scholarship from journals, and newspaper reports and suggests incentive-based changes in the structure of U.S. aid. As Egypt is a bellwether for much of the Arab world, establishing long-term stability in the region, improving overall economic and social conditions in Egypt, and cultivating a favorable impression of the U.S. would all be benefits of such action. Furthermore, the United States should swiftly pass the free-trade agreement it has already negotiated with Egypt to assuage the Egyptian government and promote Egyptian economic growth. All these interconnected efforts are crucial for the United States to retain its strategic interests in Egypt and ensure a stable, prosperous future for a valuable Middle Eastern ally.

Contours and Melting Crystals

Eric P. Cho
Dr. Robert Varley, Department of Mathematics, University of Georgia

The topic concerns the shape of a particular boundary contour related to a melted crystal. One of the main results from the literature recently set forth by Kenyon and Okounkov is that the projection of the outer contour to the plane is an algebraic curve, to which one naturally assigns a degree. The case when the plane curve is a cardioid of degree 4, already considered by Kenyon-Okounkov, will be discussed to lay the foundation. My research involves exploring other cases of different degrees and visualizing the corresponding curves in 3-dimensional space. This report will analyze other examples, degree formulas and geometric pictures about the projection of these melted crystal contours. Since phase transitions, such as melting or freezing, are rather complex phenomena in nature, any approximate model whose phase transitions can be examined analytically is valuable. The crystal is modeled by a configuration of little cubes, called a stepped surface, so the outer contour projects to a polygon in the plane. By taking the limit of random stepped surfaces, several known rational algebraic curves are produced as a result. With further study in the plane, counting problems arise naturally with implications to better understanding the contour model.

French Dislocation: The Syntax of Power

Andrew C. Clark
Dr. Diana Ranson, Department of Romance Languages, University of Georgia

Dislocation in French occurs when a speaker produces an element of a sentence before or

after that sentence, typically employing within the sentence a pronoun to repeat the dislocated element and to fulfill its normal syntactic position. One might say, for example, *Le chien, je le vois*, "The dog, I see it," or *Je le vois moi,* "I see it, me." Previous studies of dislocation assumed that use does not vary according to social factors such as age, sex or class, but according to the speaker's message and the pragmatic function desired. These studies focused on dislocation's function in topic shifting and comparison. In a preliminary study of corpora from two French films, *Marius et Jeanette* and *La Boum*, I used the principles of conversational analysis to link dislocation to power and solidarity among speakers. The present study will extend this analysis to the Montpellier-Rognes corpus of spontaneous French recorded in 2005 and 2006. First, I will measure the average frequency of dislocation and determine the deviation from this average for individual speakers and social groups of speakers. If the individuals deviate from the average more than social groups, this would indicate that individual stylistic choice influences dislocation more than social factors. I will then analyze the dislocations within the framework of conversational power and solidarity; a consistent link to these concepts would indicate that speakers employ dislocation to provide stylistic emphasis. This study seeks then to use the distribution of dislocation to illuminate its pragmatic functions.

Nipah Virus and Apoptosis in Cells
Caroline G. Colden
Dr. Corrie Brown, Department of Pathology, University of Georgia

Nipah virus (NiV) is a zoonotic disease that recently emerged in Malaysia. This zoonosis, or disease that can be transmitted from animals to humans, causes lethal febrile encephalitis in humans. Understanding the pathogenesis of Nipah virus infection and the role the host immune system plays during this event is critical to devising effective control measures and therapeutics. In this research, we are examining the relationship between apoptosis, or programmed cell death, during NiV infection in the guinea pig model. Apoptosis, a normal process of the immune response to control infections, is often altered by viruses to facilitate infection and spread. We hypothesized that NiV blocks the apoptosis pathway early during infection allowing for its systemic spread and massive infection of cells. To test this hypothesis we are examining histologic sections from guinea pigs experimentally infected with NiV, using an immunohistochemical assay that employs an anti-active caspase 3 antibody. Caspase 3 is an early indicator of apoptosis activation. We expect to see the same or less apoptosis signaling in tissue sections of infected animals than in those of our non-infected controls.

Physical and Structural Basis for pH Dependence of Transcription Regulation by the Anti-Sigma Factor AsiA
Benjamin P. Crane, CURO Scholar
Dr. Jeffrey Urbauer, Department of Biochemistry & Molecular Biology, University of Georgia

Anti-sigma factor proteins inhibit bacterial transcription by binding the sigma subunit of the RNA polymerase. A unique anti-sigma factor is T4 bacteriophage AsiA protein. In *E. coli*, AsiA interacts tightly with the polymerase sigma-70 subunit, and, like other anti-sigma factors, inhibits transcriptional activities. Specifically, AsiA inhibits transcription from bacterial and early phage promoters. Additionally, AsiA assists in transcription activation from phage middle promoters. Thus, AsiA is a unique molecular switch for transcription regulation. Moreover, excess AsiA kills bacteria, suggesting AsiA could serve as an antibiotic development model. Most AsiA studies have been performed at relatively low pH (6.2-7.0). Through concurrent studies, we have determined that AsiA undergoes a substantial, pH-dependent structural reorganization across the range of physiological pH. Using nuclear magnetic resonance (NMR) spectroscopy, we monitored AsiA structure as a function of pH. As pH increases to 7.8 (pK for the transition), spectra

indicate increasing structural heterogeneity. Further increasing pH to 8.2 decreases heterogeneity. At pH 8.2, spectra indicate a stable, single species, structurally distinct from that at low pH. Comparison of the NMR chemical shifts of the low and high pH forms indicates clear, localized structural changes. We have also performed experiments to determine a structure of AsiA at pH 8.1 using residual dipolar couplings (RDCs) from additional NMR experiments. At physiological pH, our results indicate an equilibrium mixture of two distinct structural AsiA forms, and that functional differences between these forms permit pH-dependent regulation. Inclusion of pH-dependent regulation in the antibiotic model could improve antibiotic efficacy.

Room–Poem

Jordan A. Dalton
Prof. Andrew Zawacki, Department of English, University of Georgia

When the echoes of our words die away, does something of them remain, pressed by the force of sound into the walls themselves? How can we read these word-fossils? Can we halt this rapid dispersion, turn temporary speech into lasting print? If the walls could tell us what they understood of our conversation, what would they say? In this piece, a room has been granted the ability to comprehend language by being given a vocabulary carved from a different, virtual space. (The room of an archive, walled off by a query.) What is then displayed here is the poem carved out of this physical space, the poem created from the (mis)understandings of the hall, the walls themselves. Software is set up in a space, and as the space lives its daily life, the software jots down some of the things it hears. From this arises a poem, to be read or displayed. Voice recognition, one of the most problematic of computer science's algorithms, can yield fascinating results in its failures. Some rudimentary voice recognition software is loaded with a predetermined vocabulary and then run in the symposium space, yielding a poem created from the space's (mis)recognitions of the language used within it. Language's collision with digital technology might leave something resembling a car crash to those used to its more conventional applications, but with a bit of work, the wreck can become something wonderful.

Long-range Retrograde Transduction of Survival and Trophic Signals in Neurons

Matthew Logan Davis
Dr. James Franklin, Department of Pharmaceutical & Biomedical Sciences, University of Georgia

Developing vertebrate neurons depend on target-derived growth factors for survival and neurotrophic support. The precise molecular mechanisms underlying long-range transduction of survival and trophic signals remain unclear. When nerve growth factor (NGF) is withdrawn from sympathetic neurons *in vitro*, a complex intracellular molecular cascade results, leading to caspase-mediated protein degradation and death. A dramatic increase in reactive oxygen species (ROS) that is a critical component of the apoptotic cascade takes place in these cells soon after withdrawal. Neurons can be rescued by late re-addition of NGF which rapidly suppresses ROS production. This suppression is evidence of a rapid survival signal. I will plate mouse superior cervical ganglion (SCG) neurons in novel microfluidic chambers developed at the University of California, Irvine, in which soma are separated from their distal axons. Cells will be deprived of NGF in both somal and distal axon compartments. Somatic ROS levels will be determined by confocal microscopic imaging of neurons loaded with CM-H_2DCFDA, a cell-permeant indicator of ROS that is non-fluorescent until oxidation occurs. An immediate decrease in somatic ROS production after re-addition of NGF to the distal axon compartment would offer evidence that *long-distance* rapid survival signals take place in sympathetic neurons. The rate of movement of the signal may allude to underlying mechanisms. Many neuropathologies will be better understood by the clarification of mechanisms underlying survival signaling, and this research could have important clinical ramifications.

The Role of Insulin-Induced Tyrosine Phosphorylation on O-GlcNAc Transferase (OGT)

Vanessa N. del Valle
Dr. Lance Wells, Department of Biochemistry & Molecular Biology, University of Georgia

Posttranslational *O*-GlcNAc modification is a dynamic process that occurs on a myriad of intracellular proteins throughout eukaryotic cells. *O*-linked *N*-acetyl glucoaminyltransferase (OGT) is the enzyme responsible for the addition of the *O*-GlcNAc moiety to serine and threonine residues of target proteins. Elevation in *O*-GlcNAc levels induces insulin resistance in cell culture models, and OGT overexpression leads to glucose disposal defects in rodents. Both of these outcomes are diagnostic of type II diabetes. Therefore, greater understanding of OGT and the *O*-GlcNAc modification is paramount to gaining further insight into the steps that lead to insulin resistance, an early feature of type II diabetes. In this study, we investigate the presence of tyrosine phosphorylation on OGT and its importance to the structure and function of the enzyme. OGT has previously been shown to be tyrosine phosphorylated in response to insulin stimulation though the site and impact of modification has not been elucidated. A point mutation was performed in which tyrosine 988 was substituted by phenylalanine on entry and expression vectors. Tyrosine 988 was chosen because it is the only in-silico predicted site for tyrosine phosphorylation. The point mutation was confirmed using restriction digestion analysis and DNA sequencing. An *E. coli* protein expression system showed the mutant OGT could be expressed after induction with IPTG. Mammalian protein expression systems as well as OGT activity assay analysis will soon follow. These studies will determine if tyrosine 988 is the site of phosphorylation and determine the impact of this modification on properties of OGT.

The Effect of Sample Handling and Storage on the Accuracy and Repeatability of Fecal Worm Egg Counts in Horses

Kimberly L. DeLisi, CURO Summer Fellow, CURO Scholar
Dr. Ray Kaplan, Department of Infectious Diseases, University of Georgia

Drug resistance in parasites is a major threat to the health and well-being of horses. Consequently, it is critical that veterinarians regularly evaluate deworming programs to determine if parasites are becoming drug resistant. Currently, the only means available to diagnose drug resistance in equine parasites is the fecal egg count reduction test (FECRT). However, the lack of any accepted standards for sample handling and storage hamper interpretation of results. The purpose of this investigation was to determine the effects of sample handling and storage on fecal egg count (FEC) data. Two parameters were examined: sample storage temperature, and length of time between defecation and sample collection. In a first set of experiments, fresh feces were collected and stored anaerobically at -10°C, 4°C, 24°C, and 38°C for five days. Fresh feces were then stored aerobically at room temperature, and sub-samples were removed for analysis at 0, 3, 6, 12, and 24 hours. FEC were performed using the modified Stoll technique. After five days at -10°C and 38°C, FEC decreased by 59% and 96%, respectively, whereas at 4°C and 24°C, FEC only changed by 17% and 14%, respectively. FEC in samples collected 12 hours after defecation decreased by only 15% whereas by 24 hours, FEC decreased by 78%. These data suggest that feces less than 12 hours old are suitable for collection, and samples can be stored either anaerobically or in the refrigerator up to five days. These results provide a scientific basis for new recommendations to standardize methods used for FECRT.

Emergency Response: Bringing It to Georgia

Nicole C. DeMarco & Aqsa Mahmud, Roosevelt @ UGA
Dr. Michael Beck, International Center for Democratic Governance, University of Georgia

The events on 9/11 in New York City and Washington, DC stress the role of local governments as the first line of response to terrorist threat. Therefore, it is necessary to act in a manner guaranteeing optimal level of cooperation amongst the various entities of first-responders. At the federal level, the Department of Homeland Security acknowledges the importance of local emergency response and thus, has created a system by which it allocates funds for the construction and maintenance of emergency response services. Federal money is designated to the state and then filtered to local governments. The state's main function is administration and fund allocation; primary responsibility of implementing emergency response programs falls on local governments. However, once received, local governments vary on their spending. This allows individual jurisdictions to invest in a manner that maintains low operability with neighboring municipalities. In such instances, response efficiency is lost. For example, adjacent local governments may invest in identical emergency programs to prepare for biological attack. However, this duplication is a) a misuse of funds, and b) may decrease response time due to miscommunication amongst first responders. In order to combat obstacles associated with the current methodology in the state of Georgia, our proposal establishes a system that ties funding to the adoption of mutual aid legislation. In order for municipalities to receive funding, they must administer measures of local cooperation to ensure a maximum level of efficiency in response to terrorist attacks.

Reforming Subsidies in the Federal Budget

William Patrick Dever, Roosevelt @ UGA
Dr. William Lastrapes, Department of Economics, University of Georgia

The U.S. government allocated approximately $52.52 billion in subsidies in 2006, accounting for 3 percent of total government expenditure. Many of these subsidies, though, actually reduce social welfare because of a lack of information and political lobbying. The U.S. government fails to properly assess the costs and benefits of every subsidy because the information required to do so often is too costly to obtain. In addition, subsidies greatly benefit a small group, giving them an incentive to lobby and provide campaign contributions to politicians, which can often influence the outcome of a vote, regardless of the social benefits or costs of the subsidy. Through detailed analysis of economic markets, this report illustrates the economic effects of both proper and improper subsidies and proposes the creation of an independent Subsidy Review Board (SRB). A twelve-person panel, with one member representing each of the twelve Federal Reserve districts, will lead the organization. All subsidies will be evaluated on the regional and national level under the specific criteria established in this report. This proposal will eliminate information asymmetries, because firms wishing to obtain a subsidy will have to present a detailed report on the societal benefit of the subsidy to the SRB, which will shift the information costs from the government. Furthermore, an independent Board will not be as susceptible to political or socio-economic pressures as individual legislators. A reformation of the federal subsidy process will eliminate billions of dollars from the federal budget each year and direct better allocation of the remaining funds.

U.S.-China Energy Cooperation: A Step toward Greater Environmental Cooperation
John T. Dixon, Roosevelt @ UGA
Dr. Rhett Jackson, Department of Forestry, University of Georgia

Even as global warming receives an increasing share of public debate, the world's largest contributors to greenhouse gases, the United States and China, are also two of the most reluctant countries to take action against climate change. The United States has long been the global leader in energy consumption, but China's stunning growth requires that it consume ever-increasing amounts of oil and coal. Unfortunately these sources of energy are some of the worst sources of greenhouse gases. Reviewing current policies and research in the field exposes the lack of effort and ability to factor climate change into energy plans. Any serious attempt to conquer the energy challenges of our time will require serious effort, cooperation, and leadership from both of these countries. To remedy the stark inadequacies in current climate change policy, the United States and China must enact policies to increase nuclear power cooperation and improve clean coal technology. Both governments should support these technologies, as they will require government investment to reach an adequate scale. The two countries will also have to consult each other to shape laws and build government agencies tasked with managing the push for a cleaner environment. Understanding institutions and trends in both countries allows us to create better policies to encourage cleaner growth through nuclear power. Cooperative efforts can build trust and solidarity between the United States and China, and both countries will benefit from technological improvements that will allow them to wean themselves off of oil and coal.

Metabolic Studies in *Toxoplasma gondii*
Melissa D. Docampo
Dr. Boris Striepen, Department of Cellular Biology, University of Georgia

Toxoplasma gondii is a protozoan parasite causing severe disease in immunocompromised patients and fetal disease during pregnancy. This pathogen harbors a chloroplast-like organelle named the apicoplast. We are interested in the metabolic functions of this organelle as targets for parasite specific drug development, because the organelle is absent in human cells. The route we have taken to analyze the value of individual targets is to construct genetic mutants. In this study we have begun to analyze how mutants deficient in apicoplast metabolism and protein import are affecting the metabolic state of the parasite. The gene chosen for the pilot study encodes acyl carrier protein (ACP), which is important for fatty acid synthesis. This is essential for the parasite's growth. We grew the mutants and parental strains for six days, and then extracted the cells with chloroform and methanol and separated the extract into organic and aqueous phases to perform metabolomic studies. These studies were performed by mass spectrometry. A decrease in fatty acids was observed in the ACP mutants. One of the most interesting changes was the presence of very high levels of gamma aminobutyric acid (GABA), which is known to be involved in a stress pathway in plants. Based on our metabolomic studies, we are also building a larger and more representative model to fully understand the contributions that different synthesis routes make to the overall fatty acid metabolism of the parasite.

Two Faced Politicians: Political Supply versus Constituent Demand in Health Rationing Policy
Rachel M. Dolan
Dr. Anthony Bertelli, Department of Public Administration & Policy, University of Georgia

Recently the policy of the National Healthcare Service (NHS) in the United Kingdom has created controversy as well as increased public

interest and concern in its efforts to cut costs and increase efficiency through so-called "health rationing," deciding objectively the recipients of health care. With an increase in concern also comes an increase in demand for representation pertaining to health and the NHS by constituents concerned with the state of their healthcare. However, demand for representation of interest by constituents does not always mean that their Members of Parliament (MPs) will supply it because MPs juggle conflicting interests: those of universal benefit versus particular benefit, those of the political party as well as those of the constituency (Norton and Wood 1993). This paper explores the "two faces," the face of the party as well as that of the constituents, in relation to the topic of health rationing, a topic with political implications, to determine the consequences and possible ramifications caused by these competing interests. This paper proposes constituents' interests are represented by MPs asking questions and that those of greater risk of rationing get questions asked on their behalf. Furthermore, per Norton and Wood (1993), newer MPs are more likely to represent the interests of their constituents in an effort to build electoral support. By examining questions put to the Secretary of State for Health from 1998-2005, the attention to the issue by MPs can be determined because the questions are a public forum in which backbench MPs, those without leadership positions, can easily claim credit for addressing issues of importance. Using the number of health rationing mentions in the questions asked by MPs to the Minister as the dependent variable and juxtaposing a number of factors, including constituency demographics and political factors such as seniority, this paper endeavors to discover the effect of each on Parliamentary attention to health rationing.

Roswell Voices: Oral History and Linguistics in Roswell, Georgia

Joshua A. Dunn, CURO Summer Fellow
Dr. William Kretzschmar, Department of Linguistics, University of Georgia

The Roswell Voices project emerged as a joint project of oral history and linguistics between the Folk and Heritage Bureau of Roswell, Georgia, and faculty and students of the University of Georgia. The stage of research presented here is a continuation of this program and focuses solely on the language of the youth of Roswell, those within the 18 to 35 year old demographic bracket. I examined the question of how the language of a speaker contributes to his cultural identity in relation to Roswell, a localized question but one whose methods and results can be applied to study a broader scale. I implemented a three part interview, a method inherited from the existing study. Part one entailed a one hour conversation-style interview; part two consisted of the speaker reading certain words from index cards; and the third part involved the interviewer asking questions aimed at a certain lexical response. I conducted, transcribed, and analyzed four interviews by counting features generally associated with Roswell's geographic location. After performing feature counts on data collected previously on two older age brackets, results suggest that the data collected not only characterize generation specific speech, but also define the youth of Roswell as being definite "southern" speakers, as can be determined from the prevalence of accepted "general southern" speech characteristics, despite the lack of further regional specificity. My plans for future study include tracing the history of certain recorded pronunciations and lexical responses, both in previous data and that collected for this project.

Antibody Extraction

Sean P. Durning
Dr. Lance Wells, Department of Biochemistry & Molecular Biology, University of Georgia

The post-translational modification of cytosolic proteins at serine and theronine residues with the sugar N-acetyl glucosamine (GlcNAc) has been demonstrated to play a major role in regulatory processes. For example, elevated levels of O-GlcNAc have been directly correlated in humans and mice with insulin resistance, the hallmark of Type II diabetes, while in the model system *C. elegans* it has been tied to an extended lifespan. This dynamic process referred to as "O-

GlcNAcylation" occurs via the addition and removal of GlcNAc molecules on target proteins by the enzymes O-GlcNAc transferase (OGT) and O-GlcNAcase (OGA), respectively. Successful antibody recognition of OGA and OGT is a powerful tool for understanding the mechanism of O-GlcNAc structural alteration within a cell. My work has focused on purifying and characterizing antibodies that recognize either OGA or OGT. These IgY antibodies are generated in chicken egg yolks against synthetic peptides whose sequence was derived from the primary structure of either OGA or OGT. This approach was used in order to minimize the possibility of non-specific recognition to other proteins and potentially allows us to generate very large amounts of the antibodies, which can be used in a wide variety of tissues and cells from various species. Antibody extraction is performed through IgY Eggpress Purification Kit protocol, in which separate reagents are used for delipidization and protein precipitation. Following successful enrichment of antibody 352, Western Blot analysis confirms specific recognition towards over-expressed OGA lysate. Endogenous recognition of extracted 352 has not yet been confirmed, potentially requiring additional antibody purification. Antibody 470 that is proven to successfully recognize OGT remains in preliminary extraction and Western Blot efficiency stages. Once extraction and enhancement for OGA and OGT is complete, antibodies 352 and 470 will be used for further scientific research involving O-GlcNAc post-translational modifications that play major roles in intracellular behavior.

Cataloging Biodiversity: Filling in the Gaps for Coastal Ecuadorian Herpetofauna

Andrew M. Durso
Dr. Paul Hamilton, Department of Biological Sciences, University of Georgia
Jonathan M. Pahlas, Department of Biological Sciences, University of Georgia

The coastal forests of Ecuador are some of the most diverse ecosystems on Earth. Identified as a Global Biodiversity Hotspot by Conservation International in 1999, the Chocó region has suffered reductions in area of over 90% since aboriginal times. Concern for reptiles and amphibians which depend on these habitats has prompted efforts to collect data on their biodiversity, life history and interactions with other species and the environment. We provide data on community composition of herpetofauna in these imperiled habitats, and examine phenotypic variation in reptiles and amphibians for future studies of systematics and taxonomy, contributing to a five year data set. By building species accumulation curves for each site, we provide a measure of survey quality and to illustrate the potential difficulty of sampling rare and cryptic species in diverse tropical forest ecosystems. Such surveys are critical for conservation of biodiversity.

A Domitianic Predecessor to the Arch of Constantine?

Jason E. Dyer
Prof. James Anderson, Jr., Department of Classics, University of Georgia

Originally believed to be a product of Late Antiquity, the Arch of Constantine in Rome poses a unique set of problems regarding Roman topography. Though A. L. Frothingham's controversial theories regarding a predecessor to the Arch of Constantine were initially rejected, recent evidence suggests that while re-appropriated and dedicated by Constantine, the arch bearing his name may have had a predecessor centuries earlier. This predecessor was likely Domitianic, and corresponds with this emperor's grandiose building program and Roman topography during the Flavian dynasty. Isotopic analysis, the measurement of carbon and oxygen isotopes in marble samples, evidences that much of the Arch of Constantine's exterior decoration was gleaned from early monuments, a common practice during the 4th century C.E., and indicates rapid construction. Such brevity could only be achieved, however, if a structure were already present. Furthermore, the Haterii relief, which is noted as providing an accurate depiction of Roman topography, features an earlier triumphal arch where the Arch of Constantine now stands.

When considered with field of view analyses and Roman topography, the numismatic evidence, once used to counter the theory of such a predecessor, has proven to be flawed. Indeed, the presence of such an arch under Domitian in this location would correspond with the Triumphal Route and larger Flavian building program. Taken as a whole, evidence indicates that the possibility of a Domitianic predecessor to the Arch of Constantine requires further consideration.

Sex-Related Differences in Pain Experience in Marathon Runners

Jessica E. Dyke
Dr. Patrick O'Connor, Department of Kinesiology and Department of Exercise Psychology, University of Georgia

The purpose of this study was to compare women and men on their pain experiences caused by a marathon run. Over 1000 marathon runners completed an online survey. The data base was examined for pairs of men and women who could be matched on four pain-related variables: the average number of days per week the participant trained for the marathon, the marathon course run (e.g., Boston marathon course), the relative intensity at which the marathon was run as indexed by the overall rating of perceived exertion and the highest intensity of pain ever experienced. Marathon related pain reports from 31 men and 31 women were compared using t-tests. Women reporting experiencing pain significantly earlier during the marathon (mean pain threshold was at 14.3 miles for women and 17.9 miles for the men, $p < .01$). Women reported experiencing significantly higher intensity pain 1 to 3 days after the marathon using a 0 to 10 pain intensity scale (female mean: 6.1; male mean: 5.1, $p < .05$). These findings are generally consistent with prior research on sex-related differences in laboratory pain showing that compared to men women report on average a lower pain threshold and a higher pain intensity in response to the same noxious stimulus. This study is among the first to analyze sex-related differences in pain experienced during the extreme conditions that are self-imposed during a marathon. Sex-related differences in pain during and after a marathon have potential relevance for optimizing the training, performance and treatment of marathon runners.

Rethinking the U.S.'s Relationship with the Global Poor: A Restructuring of USAID's Microfinance Efforts in Africa

Ellyn A. Echols & Jeremy Akin, Roosevelt @ UGA
Dr. Glenn Ames, Department of International Public Service and Outreach, University of Georgia

As Africa's strategic importance on the global stage increases and other major powers such as China take notice, it is time for the United States to consider the future of its own economic role in the continent. We examine USAID's current partnership with Africa in its support of microfinance institutions that are locally operated and intended to reach the very poor. Microfinance techniques can be powerful catalysts of development in third-world countries because they economically equip households by giving small, low-interest loans to entrepreneurs in order to establish and maintain small businesses—strengthening the very base of a stable economic system. We assert that it is in the best interest of the United States to reevaluate and enhance its anti-poverty measures via a more effective implementation of microfinance in a continent that has traditionally been overlooked. By renewing its emphasis on partnerships with existing organizations, restructuring its loan system, and by significantly improving representation of Africa in its microfinance efforts, USAID will more effectively move toward its goal of poverty eradication. These reforms will also foster a better environment for global trade, a more stable continent, and the potential for greater democratic cooperation among U.S. and African governments.

Increasing Trade Security: United States-Venezuelan Trade Incentives

Nathaniel T. Edwards, Roosevelt @ UGA
Dr. Christopher Allen, Department of International Affairs, University of Georgia

Trade with Venezuela has risen to the top 15 nations with which the United States conducts trade; it has also become the fourth largest provider of American crude oil and petroleum products, topping over a million barrels every day. While trade with Venezuela has steadily increased, diplomatic relations have steadily declined due to open antagonism and criticism by both sides. In juxtaposition, there is a significant national security threat as Venezuela becomes a prime locale by which to load a weapon on a boat intended for American ports and Venezuela offers little domestic protection of exports to America. This risk is becoming even greater as Chavez continues to increase relations with American adversaries and openly critiques American capitalism. As trade relations increase, each state can demand a greater level of security be met and maintained in order for trade to continue. Therefore, this paper proposes the creation of a system of economic incentives in exchange for meeting and maintaining security standards at ports. Because there is a risk of Venezuelan hesitance to participate, the policy aims to appeal exclusively to the economic sector of Venezuela and avoid political confrontation. Furthermore, it aims to avoid Chavez' criticism of capitalism by establishing a controlled economic system between the United States and Venezuela. This policy will be rationalized by comparing similar case studies as well as noting inherent benefits of trade systems.

Environmental Factors Affecting the Persistence of Avian Influenza Virus in Water

Christina L. Faust
Dr. David Stallknecht, Department of Wildlife Disease Study, University of Georgia

Transmission of avian influenza virus (AIV) is dependent on an indirect fecal-oral route involving fecal-contaminated water; however, little is known about the persistence of AIV in aquatic environments. Although studies have shown that temperature, pH and salinity affect the infectivity of AIV in water, biological factors have not been considered. The objective of this study is to examine the influence of filter feeding bivalves on the persistence of AIV in water. Freshwater clams, *Corbicula fluminea*, were used as model organisms and placed into individual tissue culture flasks (n=42) filled with distilled water that was inoculated (1:100) with low pathogenic AIV. Water samples were taken a minimum of three times during 48 hours, and after each trial the clams were processed for in situ hybridization. The virus titer (amount of virus) of the water samples was quantified using microtiter endpoint titration. Over the 48 hours, the virus titer decreased (compared to control flasks) or was undetectable in water samples from flasks with filter feeders. The preliminary results of this study suggest that filter feeders, reduce the persistence, and thus infectivity, of AIV. In situ hybridization will be used to determine the location and status of AIV within clam tissue after filtration from the water column. Studying impacts of environmental factors, such as filter feeders, on the epidemiology of AIV will help develop an understanding of the maintenance of AIV within wild aquatic bird populations and aid in the management of AIV.

The Impact of Family Relations, Health Perceptions, and Parental Functioning on Adherence and Medical Outcomes in Adolescent Transplant Recipients

Nicole M. Fenton & Emily Osborn
Dr. Ronald Blount, Department of Psychology, University of Georgia

While organ transplantation was once a last resort for terminally ill children, it has become the treatment of choice for individuals with a number of illnesses. Although the survival rate is high for transplant patients, their long term prognosis deteriorates due to patients not taking their medication in accordance with doctor's instructions (medication nonadherence). High

rates of nonadherence have been reported in pediatric populations, particularly during adolescence (Shaw et al., 2003). Not taking the prescribed immunosuppressant medications may result in a patient's body rejecting the transplanted organ. This study seeks to examine how psychosocial factors such as family relations, health perceptions and parental functioning relate to medication nonadherence and therefore medical outcomes. The present study was an 18-month longitudinal investigation of adolescent transplant recipients and their families. Participants in the initial cohort were 68 adolescents who had received a kidney, liver, or heart transplant and their parents. Each of these participants were re-contacted and measures of physical and psychosocial functioning, as well as medical records, were obtained. Based on the literature and findings from our initial cross-sectional evaluation, it is expected that high levels of family cohesion, low levels of family conflict and healthy parental emotional functioning will positively influence medication adherence and therefore medical outcomes 18 months later. The relationship between parent functioning and adolescent health outcomes is expected to be partially mediated by adherence. This study will identify risk and protective factors for health outcomes in adolescent transplant recipients, and help guide the development of interventions to improve health in this vulnerable population.

Cloning, *E. coli* Expression, and HPLC Enzymatic Assay Analysis of Putative Domains of Arabinose Kinase

Kathryn S. Flake, CURO Summer Fellow
Dr. Maor Bar-Peled, Complex Carbohydrate Research Center, University of Georgia

Nucleotide sugars are produced by three pathways: the sucrose, interconversion, and salvage pathways. The salvage pathway recycles monosaccharides released from either seed storage polysaccharides, wall reconstruction, glycoproteins, or glycolipids and converts them back into activated nucleotide sugars by means of over 20 differing sugar-1-phosphate intermediates. Identifying and characterizing all salvage pathway enzymes are therefore critical steps in determining the contribution this pathway makes towards the nucleotide sugar reservoir. Arabinose kinase is an enzyme in the salvage pathway responsible for phosphorylating arabinose to arabinose-1-phosphate. There are discrepancies regarding the biochemical properties of the kinase, its subcellular localization, and its biological function, which must be resolved. The gene encoding arabinose kinase (*arak*) consists of two domains: a galactokinase-like domain, speculated to have kinase function, and a large N-terminus domain whose function is unknown. Therefore, using RT-PCR, we constructed and cloned several gene constructs expressing either the N- or C-terminal domains in addition to two versions of the protein (full-length or truncated Δ50) linked at their C-terminus to an EGFP reporter protein. The expression of the galactokinase-like domain and the truncated version of the N-terminus (Δ50) in *E. coli* were verified by SDS PAGE. Current study is aimed at defining the enzymatic properties of the various constructs using HPLC enzymatic assays. Additionally, biochemical analysis and determination of the subcellular localization will help in elucidating the activity of arabinose kinase.

Voltage-Dependent Anion Conductance (VDAC) Porin: A Possible Channel for Cytochrome c Release in Apoptosis

Ashley L. Foster, CURO Scholar
Dr. James Franklin, Department of Pharmaceutical & Biomedical Sciences, University of Georgia

Apoptosis, a type of programmed cell death, has been identified as a key component in several biological processes, including embryological development and neurological disease. Apoptosis is necessary for maintaining tissue homeostasis by regulating the balance between cell growth and death. While unchecked apoptosis leads to degeneration, the inhibition of apoptosis leads to cancer. Determining the molecular mechanism of apoptosis will aid in understanding cellular processes and in future treatments of disease. The mammalian intrinsic

apoptotic pathway involves the release of apoptogenic factors, such as cytochrome *c*, from the mitochondrion into the cytoplasm through an unknown porin. This release activates a cascade of caspase proteases, DNA fragmentation, and ultimately cell death. A proposed mitochondrial channel for cytochrome *c* release is the Voltage-Dependent Anion Conductance (VDAC) porin that spans the outer mitochondrial membrane. Preventing the release of cytochrome *c* halts the apoptotic process. Thus, inhibition of the VDAC porin could potentially prevent cytochrome *c* release into the cytoplasm and the activation of the apoptotic cascade. The present study primarily used the non-specific inhibitor, DIDS (4, 4'-diisothiocyanatostilbene-2, 2'-disulfonic acid disodium salt hydrate), to block the VDAC porin. By fluorescence microscopy, fluorescence spectroscopy, survival experimentation, and immunocytochemistry, the activity of the VDAC porin in the apoptotic cascade was analyzed. My research, found that the VDAC porin is not the channel through which cytochrome *c* is released.

La Voz de los Sin Voz: The Use of Radio by the Zapatista Movement in Mexico

Erika D. Frank
Dr. Pamela Voekel, Department of History, University of Georgia

This paper will explore the use of media by the Zapatista movement, focusing particularly on radio and internet radio. It will seek to explain exactly why these mediums were so effective and what impact they had on the movement from its beginnings in 1994 to the present. The Zapatista Army of National Liberation is a revolutionary indigenous group in Chiapas, Mexico. Their uprising in 1994 has been called the first "post-modern revolution" and has set itself apart from rebellions of the past. Since the uprising, the world has been watching the region and rebel leaders for clues as to what pattern revolution will take in our globalized society. The Zapatistas set themselves apart from other indigenous uprisings through their use of local and foreign media, particularly radio, to gain international visibility and to inform and organize their supporters efficiently. Radio is a uniquely suited medium for this type of rebellion because it is accessible to their largely illiterate target audience, is inexpensive, and is elusive to government control. The paper will explore their media strategy through analysis of the audio archives of Radio Insurgente, the dominant station in Chiapas, and Radio Zapatista, a weekly Pacifica program recorded in Berkley, CA as well as interviews with station personnel and secondary sources. This analysis demonstrates the importance of radio to the strength and success of the Zapatista movement.

Vesicular Stomatitis in Cattle

Ryan M. Friday
Dr. Corrie Brown, Department of Pathology, University of Georgia

Vesicular stomatitis virus (VSV) causes blistering in many large animals with lesions at specific sites. Outbreaks of VSV result in severe restrictions on movement and production. As such, the virus mostly poses a threat to the food animal industry. VSV is believed to spread via contact as well as through the bite of infected insects. It is believed that the black fly's salivary gland extract (SGE) facilitates viral uptake and replication. Preliminary evidence for this theory lies in the difference in the number of virus particles lesion formation requires when cattle are artificially infected versus the amount required when the black fly is involved. When researchers set out to create a lesion, doing so requires the application of approximately 10,000 times as much virus as the fly carries. The objective of this study is to determine whether it is the presence of SGE or some other factor that allows the virus carried by the flies to be so much more effective. Reaching conclusions about the natural spread of VSV is important to veterinarians and farmers who must contend with it, as evidenced by the fact that this study is funded in part by the USDA. To test the possible magnifying effects of SGE, seven cows were infected along the coronary band with differing concentrations of VSV and SGE. Tissues were collected at varying intervals postinfection. Immunohistochemistry, a technique to detect the amount of virus within fixed tissue, was used to

assess the amount of replicating virus within the inoculated tissue.

Potential Novel O-N-acetylglucosamine Transferase (OGT) Downregulation Technique for *D. rerio*

Steven A. Gay, CURO Apprentice
Dr. Scott Dougan, Department of Cellular Biology, University of Georgia

The role of post-translational modifications such as phosphorylation in regulating developmental pathways has been studied extensively. However, little is known about the role of the post-translational modification O-N-acteylglucosamine (O-GlcNAc). Although studied extensively in plants and mammalian cell culture, the role of O-GlcNAc in animal development is not fully understood. Unlike other post-translational modifications occurring in the Golgi and the Endoplasmic Reticulum (ER), O-GlcNAc modification of nuclear and cytoplasmic proteins allows for its potential involvement in multiple developmental pathways. The addition of O-GlcNAc to a wide variety of nuclear and cytoplasmic proteins occurs by the enzyme O-N-acetylglucosamine transferase (OGT). In zebrafish, OGT is expressed ubiquitously in the first 24 hours post-fertilization before restricting to the head. Structurally, the OGT protein contains a C-terminus catalytic domain connected by a flexible connector to an N-terminus protein-binding domain. Tetratricopeptide repeats (TPRs) exist within the N-terminus domain of OGT, which in rats allows OGT to act catalytically as a homodimer. Due to the very high degree of OGT sequence conservation between species, we utilized the N-terminus TPR domain to design a dominant negative construct, zNOGT, to examine the role of OGT during zebrafish embryogenesis. When zNOGT mRNA was injected into embryos before the eight-cell stage, the embryos' development were delayed and displayed a wide variety of defects including severe growth retardation of the tail and head that we are currently characterizing. In the future, zNOGT will be a tool to assess OGT function in later stages of zebrafish development such as development of the head.

Association Between Infant Feeding and Overweight/Obesity in Ghana, West Africa

Elizabeth K. George
Dr. Alex Anderson, Department of Food & Nutrition, University of Georgia

Obesity has rapidly become a leading public health issue around the world, including developing countries. A number of studies have shown an association between the type of infant feeding and overweight/obesity among mothers and their children, especially in the developed countries with limited data from developing countries. This data was generated from a needs assessment study conducted by UGA students participating in a service-learning program in Ghana, West Africa during the summer of 2007. The purpose of the study was to assess breast feeding and infant/child nutrition practices in relation to overweight/obesity. Mothers with a child five years or younger participated in the study. The mean age of the mothers was 27.39 years with an average of 9.56 years of formal education. Majority of the mothers exclusively breast fed the index child for six months or less. Mothers with more years (> 10 years) of formal education exclusively formula fed their children. Further analysis of the data showed a relationship between the type of infant feeding and maternal BMI with those who exclusively formula fed having a higher BMI. There was an inverse relationship between years of maternal education and both maternal and child BMIs. The data also shows that children who exclusively breastfed had a lower BMI. In conclusion, our results show that mothers who practice exclusive breastfeeding have a lower postpartum BMI compared to their counterparts who practice mix feeding or exclusive formula feeding. A similar trend was found among the children.

Characterizing the 'Small Proteome' in the Hyperthermophilic Archaeon *Pyrococcus furiosus*
James T. Gordy, CURO Summer Fellow, CURO Scholar
Dr. Michael Adams, Department of Biochemistry & Molecular Biology, University of Georgia

The archaeon *Pyrococcus furiosus* (*Pf*) is an anaerobic hyperthermophile originally isolated from a geothermal vent on a seabed near Italy. It grows optimally at 100°C, the normal boiling point, and as a consequence its enzymes have a lot of potential for high temperature applications. Many of them have been characterized, but due to inherent difficulties in extraction and isolation, little data is available from the low molecular weight proteome (under 15 kDa) of this organism. The goal of this project was to create a method that could generate small proteins in high enough yield for further analyses. All steps were performed anaerobically to preserve the integrity of oxygen-sensitive proteins. The cytosolic fraction of *Pf*, prepared by high-speed centrifugation of sonicated cells, was analyzed by gel filtration chromatography. The fractions were analyzed for protein and metal contents, and by native and SDS-denaturing gel electrophoresis. Using a Superdex 75 column, which fractionates in the molecular weight range from 3 - 70 kDa, the small proteins (< 15 kDa) were separated from the larger proteins. Anion-exchange chromatography (Bioscale Q2) was used for further separation. In order to yield sufficient amounts of the so-called small proteome for further analysis, a larger amount of cell paste (>10g) needs to be used as the starting material. The optimized procedure for obtaining the small proteome for further analysis will be presented and discussed.

Sketches in Noir
Brian Graiser
Dr. Leonard V. Ball, Jr., Department of Music Theory & Composition, University of Georgia

Sketches in Noire, written in 2007, is a multi-movement work akin in spirit to the "film noir" genre, representing in sound a dramatic and somewhat bleak story. The names of the seven movements supply the storyline: The Twilight Fog Rolls In; The Heist; The P.I.'s Office (Some Snappy Dialogue); The Woman by the Docks; The Social Club; The Cement Overcoat; and On the Lam/Fin. The CURO Symposium program will feature three of the movements.

Brian Graiser, Vibraphone

The People
Adam Gruszynski
Prof. Ted Saupe, Department of Ceramics, University of Georgia
Prof. Sunkoo Yuh, Department of Ceramics, University of Georgia

Lately I have been exploring different ways to express myself through clay. I build each sculpture quickly to create a gesture. Later I carve, scratch or throw thin slabs of clay on the surface. It is important to have every part of the process make its own visual mark on my work. To enhance the texture I use multiple amounts of stains and apply glazes in specific areas to contrast the rawness of the clay. I work mainly with stoneware and use multiple firing techniques such as salt, raku, electric, and gas.

The People, 2007. Porcelain glazed.
The Tower, 2007. Stoneware and porcelain glazed.
Nancy, 2007. Stoneware and gas reduction.

Hispanic Music in Athens, Georgia
Jana M. Hanchett, CURO Summer Fellow
Dr. David Schiller, Department of Musicology & Ethnomusicology, University of Georgia

The Athens-Clarke County police department estimates that 5% of the Athens population is Hispanic or Latino. This 5% consists of 20,000 individuals who are often marginalized from the Athens community due to language barriers and immigration statuses. I propose that musical experiences shared between Hispanic/Latino musicians and the Athens community will encourage social cohesion. Athens already accepts the sounds of Latin music (for example, Grogus, Cachaça, Moyuba, and salsa nights at downtown venues), but these groups consist primarily of Caucasian musicians and do not represent the voice of Athens' Hispanic/Latino immigrants. Consequently, my research centered on discovering what and where Hispanic musicians are playing in Athens. My initiation into fieldwork began on June 3, 2007, at a fiesta celebrating the Feast of the Trinity at Pinewoods Estates. Here I met IncaTepec, a music group made of two Mexican brothers, Noe and Humberto Mendoza. From them I also learned of Banda Kazador, another music band who practices popular Mexican music behind a community tienda. My fieldwork included interviewing these Mexican musicians, video recording and transcribing examples of these musicians' works, photographing the musicians within their musical environment, and playing their music with them. My objectives were threefold: 1. describe the music of IncaTepec and its function in Athens 2. describe the music of Banda Kazador and its function in Athens 3. compare and contrast IncaTepec with Banda Kazador. As cultural mediators, both groups combine American elements with Mexican music, but their music reveals two very different concepts of bridging cultural boundaries.

Corticosterone and Its Effects on Stress-Induced Weight Loss
Samantha J. Haring
Dr. Ruth Harris, Department of Food & Nutrition, University of Georgia

Rats exposed to repeated restraint (RR) stress, which is placement in a tube for three hours on three consecutive days, show a prolonged reduction in body weight. One hormonal response to stress is an increase in circulating corticosterone, a steroid hormone released from the adrenal glands. To determine if weight loss caused by RR is dependent on corticosterone, we performed a study with rats in which adrenal glands had been removed (adrenalectomized) eliminating their normal production of corticosterone. Adrenalectomized rats were separated into both RR and control groups, and the RR rats were divided into those that received corticosterone versus saline injections. The rats with intact adrenals were separated into two groups, RR and control. Blood samples were collected during stress to ensure that corticosterone injections replicated stress-induced corticosterone release. Adrenalectomized RR and control rats that received corticosterone maintained a reduced body weight after stress. The adrenalectomized RR rats that received saline lost less weight than the other groups of RR rats and regained the weight loss after stress. The adrenalectomized control rats that received saline showed little weight change. These results suggest that corticosterone is effective in resetting body weight without RR and also that RR-induced weight loss requires corticosterone release. We

now suggest that corticosterone, during RR, is important for the rats to achieve and maintain a reduced weight.

The Diplomatic Face of America: Promoting Diversity in the U.S. Foreign Service
Cain Harrelson, Roosevelt @ UGA
Dr. Kaye Sweetser, Department of Advertising & Public Relations, University of Georgia

The United States has long been represented abroad by socio-political elites, uncharacteristic of this country's richly diverse population. While legislation mandates active minority recruitment and retention across federal agencies, these efforts rarely produce substantial results. In fact, only 13 percent of the diplomatic corps comes from a minority background, while 40 percent of the overall American workforce is comprised of racial minorities; such trends are indicative of continually declining minority employment in crucial diplomatic roles. This work confirms prior research on diversifying the U.S. Foreign Service, with particular emphasis on how the lack of minority representation distorts policymaking; how diverse backgrounds and experiences translate into innovative foreign policy; and how racial diversity may positively shape the image of America abroad. In extending previous research, this work evaluates the impact of racial composition in influencing public opinion in volatile regions of the world, particularly since the beginning of U.S. involvement in Afghanistan and Iraq. Making use of Allan Goodman's initial model in addition to formative theory of diversity in public relations, the resulting policy proposal seeks to build a more representative diplomatic corps, incorporate broader ideological diversity, and improve public affairs abroad. Accordingly, the Department of State policy must expand its efforts in the recruitment of qualified racial minorities, and senior leadership must enhance the overall organizational culture by actively supporting underrepresented groups pursuing leadership positions in order to advance foreign policy objectives and public diplomacy strategies.

Newcastle Disease Pathogenesis
Laura M. Harrison, CURO Summer Fellow
Dr. Corrie Brown, Department of Pathology, University of Georgia

Exotic Newcastle Disease Virus (ENDV) is one of the foremost threats to the poultry industry. Virulent viruses can quickly sicken and kill an entire house of chickens. Presence of any virulent viruses within our country will seriously damage our abilities to export chicken meat or live birds. The last outbreak of Newcastle disease in the US happened in California in 2002-2003. That outbreak claimed the lives of 4 million birds, required 8 months to eradicate the virus, and cost over $300 million dollars to the industry. An enhanced understanding of the pathogenesis of the disease, that is, which organs are predominantly infected, and how that damage occurs, would help greatly in devising better vaccines and overall control procedures. With this study, immunohistochemistry for the viral nucleoprotein was performed on tissues of experimentally infected animals with the viral strain from the 2002 ENDV outbreak in Australia. Further analysis of pathogenesis was done through immunohistochemistry for inducible nitric oxide synthase, a key component in inflammation, and active caspase 3, an indicator of apoptosis. Viral nucleoprotein was detected in brain, intestines, cecal tonsils and spleen. Lymphoid tissue in the intestine had greatest nitric oxide synthase and active caspase 3 expression, as compared to negative controls. These preliminary results will be helpful in leading to a better understanding of the host response to the NDV infection.

The Road to Violence: Nonviolent v. Violent Actors in Bangladesh
Clare J. Hatfield, CURO Summer Fellow & Maggie Mills
Dr. Mia Bloom, Department of International Affairs, University of Georgia

This project explores behavioral relationships among state, violent nonstate, and nonviolent nonstate actors in Bangladesh from 1980-2005. The authors ask whether government policies

directed towards violent and nonviolent dissident groups result in different responses by various nonstate actors. To answer the question, they develop several hypotheses. To begin, if the government targets nonviolent social actors with the same repressive policies it employs against violent dissident groups, the otherwise nonviolent actors should respond with increasingly hostile behavior. Second, the theoretical model suggests that the wider population mobilizes into both violent and nonviolent dissident groups. The authors will disaggregate dissident groups into violent and non-violent groups, separating social actors such as labor and student unions from rebel and terrorist groups. Previous studies largely ignore such non-violent group interactions or aggregate such groups' tactics together with rebel and terrorist groups' tactics. Others explore how violent groups' interactions or competition over resources can lead terrorist organizations to ramp up the use of violent tactics (Bloom, 2005). This study is the first to examine whether the same types of state policies directed at violent groups similarly affect or even provoke violent responses from otherwise nonviolent actors. Preliminary findings reveal that government interactions with nonviolent groups oftentimes serve to mobilize the wider population into both violent and nonviolent groups and movements. If the final data supports the authors' hypotheses, the results will imply that the government's use of equally repressive policies across all groups inspires increased violence within the state, and that the government needs to both tailor its policies towards the type of group it wishes to target and accommodate forms of nonviolent protest.

Book of Trees
Soujourner Hodges
Dr. Adrian P. Childs, Department of Music Theory & Composition, University of Georgia

Book of Trees is a five-movement work, each movement bearing the name of a tree: Juniper, Oak, Elm, Cottonwood, and Maple. It is an attempt to capture the natural and folkloric characteristics of specific trees. I will perform Juniper and Maple at the Symposium because of their energy and vibrancy. With Juniper, I tried to represent a dark evergreen, simultaneously mysterious and filled with life. With Maple, I simply tried to convey the slightly chilly, yet brilliantly colorful atmosphere of the maple tree.

Soujourner Hodges, Piano

Solving Rubik's Cube: Artificial Selection in Higher Education
Mary K. Holder, Marcia A. Cole, Bette' S. Ford, Destiny L. Murray
Dr. Farooq Khan, Department of Chemistry, University of West Georgia

Rising education costs have increased demand for a formula for student success, but prior research has taken a retrospective view, examining successful students and looking back for common characteristics. In contrast, the purpose of this study is to find determinants for cognition, the mental process necessary for learning, in order to predict and forecast a student's propensity for future success. Our study asks: in higher education, might genetic, environmental or socioeconomic factors exist that could provide a student with a relative fitness advantage and are any of them intrinsic or unchangeable? Using the Rubik's cube as a test of student success allowed us to quantify cognition as a percent of the cube correctly solved. Random samplings of the 10,000+ University of West Georgia student body were taught a specific solution method by our interdisciplinary research team of science, social science and business majors. Approximately 200 students participated in our study which consisted of completing surveys, undergoing instruction and timed pre- and post-assessments. Ordinary least squares multivariate regression analysis will determine if our variable of interest, cognition, varies with any determinants at a statistically significant level. Previously, a small pilot study indicated that learning style, evaluated via questionnaire, may be the best predictor of student cognition which is supported by other research studies. However, learning style inventories are highly

controversial in the field of educational psychology and settling this debate is outside the scope of this project. What we do hope to provide is additional evidence of the amount of correlation between learning style and student success. Regardless of the findings, the uniqueness of this study is in the measurement tools used, the types of information collected, and the research team involved which lends a different perspective on student cognition and success.

The N-Word and Its Implications on a Predominately White Campus

Erica Holland, CURO Apprentice
Dr. Robert Pratt, Department of History, University of Georgia

Since the arrival of Africans into Jamestown, Virginia in 1619, one word has evolved over time to be used as a derogatory term for African-Americans: nigger. Today the word "nigger" which has been represented as a term of hatred and bigotry, has penetrated the worlds of hip hop and mainstream media, with racial incidents being more prevalent than ever. Even with its disparaging connotation, African Americans today continue to use this word as a term of endearment amongst other African-Americans in the form of "nigga" causing unspoken confusion within the African-American community and the non-African American communities. College students are perceived to be educated people. But are these college students truly educated on the word "nigger"? How do college students, both African-American and non African-American, use this word? Who taught these college students the definition/connotation of what this word really means? Was the formal burial of the word "nigger" truly effective in banishing this ugly term? How do these various racial groups on campus view this offensive word? Are there racial incidents on campus in which African-Americans are being called nigger" and are not reporting it? Through the dissemination of surveys to African-Americans, these questions of what this word means to African-Americans will be answered. The results may show that African-Americans do not want others of different ethnic origins to use this word, yet they still want to use it.

Using Surface Enhanced Raman Spectroscopy for the Detection of Pathogens

Anna E. Hudson, CURO Summer Fellow
Dr. Richard Dluhy, Department of Chemistry, University of Georgia

A rapid and sensitive method for detecting pathogens is greatly needed. Surface Enhanced Raman Spectroscopy (SERS) has emerged as a powerful analytical technique because the scattered Raman signal is characteristic of the composition and structure of the pathogen. In SERS, the incoming laser interacts with metallic nanorods on a substrate to enhance the signal of the molecules adsorbed to the surface by an observed factor of $\sim 10^9$. Previous studies demonstrated the sensitivity and specificity of SERS, but the method has been limited by the reproducibility of highly ordered nanorod arrays and the complexity of the spectra. In response to these limitations, oblique angle vapor deposition (OAD) has been used to fabricate reproducibly sensitive silver substrates and chemometrics has been used to analyze the complex Raman spectra. To demonstrate the use of SERS as a bioanalytical technique, the OAD prepared substrates and chemometrics were used to identify and classify three strains of *Mycoplasma pneumoniae*, which is a major cause of respiratory disease in humans. Using principal component analysis and hierarchical cluster analysis, 95% of samples were correctly identified and classified by strain. This study has shown that OAD is capable of fabricating reproducible SERS substrates with high enhancement factors that can be used as biosensors. It has also shown chemometrics can correctly classify the strains of mycoplasma suspended in water with high accuracy. These results suggest SERS can be used as an inexpensive, rapid, and accurate method for detecting low levels of pathogens in water and possibly in media.

The Ecology of Enteric Bacterial Isolates in San Luis, Costa Rica

Natasha A. James, CURO Apprentice
Dr. Susan Sanchez, Department of Infectious Diseases, University of Georgia

The importance of ecotourism in Costa Rica has led to conservation efforts such as sustainable agriculture that will promote avian diversity. The development of sustainable agriculture in the form of shade grown coffee plantations has presented a unique interface between domestic and wild animals, which is an unknown frontier in disease ecology. However, these shade grown coffee plantations are being inhabited by humans and their domestic animals which include free-roaming chickens. It is known that free roaming chickens have been found to have a high prevalence of common poultry pathogens, however little information exists on the health risk that these plantations pose for free roaming birds. This study was conducted to investigate the antimicrobial resistance profiles of *E. coli* isolates of wild bird and free-roaming chickens living in coffee plantations and wild birds living in forested habitat. We hypothesized that *E. coli* isolated from chickens and birds living in human-impacted areas would have a higher prevalence of antimicrobial resistance due to horizontal transfers of bacterial genetic material from human waste and chickens. Fecal samples were collected and cultured. Bacterial isolates were identified and their resistance to a variety of antibiotics was determined. PCR was utilized to identify the genes that would confer this resistance. The general trend showed that *E. coli* isolated from chickens display a higher prevalence of antimicrobial resistance. Our data however, indicate there is no significant difference between antimicrobial resistance of the wild birds in the coffee plantations and those from the forest, thus disproving our hypothesis.

Residue Brooch

Kathleen Janvier
Prof. Mary Pearse, Department of Jewelry/Metalsmithing, University of Georgia

My present work stems from the intersection between an alternative materials study and an investigation into the tradition of historical reinterpretation. Simultaneous research into the formal qualities of plastics coupled with an interest in the aesthetic and conceptual functions of Edwardian jewelry quickly lead to the combination of both in this contemporary analysis of jewelry as image. The Edwardian period, or la Belle Époque, was known for its commitment to elegance and fashion. As industry began to rise, so too did the extravagance of the upper and middle classes who soon turned to fashion, especially jewelry, for visual suggestions of their opulent lifestyles. Elegance was associated with a delicacy of materials, a monochromatic white on white aesthetic, and an airy weightlessness. White

diamonds in barely perceptible platinum white settings surrounded by intricately laced decorative motifs became the dominant elements of acceptable Edwardian adornment and still remains a popular aesthetic choice for those wishing to call attention to their wealth and social status. The notion that this aesthetic can and does relate the same set of values today that it did one hundred years ago begs an investigation into the function of jewelry as an image of opulence and elegance. By using sterling silver chain as the drawing medium in creating loose ephemeral silhouettes of actual Edwardian artifacts, I attempt to expose the transient qualities of the image, which captures only a single instant in time that cannot be recreated but whose record remains locked in the physical presence of the visually experienced image. The frame surrounding these chain-drawings works to emphasize the function of these pieces as images of jewelry before they are seen as wearable pieces themselves. Lastly, the decision to use a lightweight, white plastic stemmed from a desire to recreate the white on white aesthetic of Edwardian jewelry while at the same time encasing and freezing the chain drawing in its transitive state of being so that the loose thin edges of the plastic relate a freshly torn feeling from some jeweler's sketchbook of a piece yet to be created.

Materials: Plastic, Sterling and Fine Silver

The U.S. Intelligence Community Must Become Centralized

Alexander B. Johnson, Roosevelt @ UGA
Dr. Loch Johnson, Department of International Affairs, University of Georgia

Preventing intelligence failures like the Pearl Harbor and al Qaeda attacks on American soil is the major motivation for bringing cohesion to the United States' intelligence community (IC). As the Soviet Union mounted a new threat against America, President Harry Truman sought to organize and unify the nation's intelligence with the creation of the CIA in the National Security Act of 1947 in order to better protect its citizens. The terrorist attacks of September 11, 2001 illuminated for lawmakers the continuation of the same problems and served as an impetus for IC reorganization in order for America to counter its new threat. Consequently, President Bush signed the Intelligence Reform and Terrorist Prevention Act (IRTPA) into law on December 17, 2004, thus creating the Office of the Director of National Intelligence (ODNI). Unfortunately, this legislation has failed in its purpose to increase efficiency and only added a layer to the already large bureaucracy. The Department of Defense and its supporters in Congress exercised its formidable power and provided the politics responsible for the [less effective] ODNI. Therefore, this policy proposal will address the shortcomings of the IRTPA through proposing IC reorganization legislation that enables cooperation among agencies. Under the amended law, an empowered DNI would have full budget and appointment powers and, therefore, the ability to manage and lead the entire IC. To support the merits of this policy, analysis will be presented from texts written by intelligence and military experts, former intelligence officials, congressional research, and contemporary media outlets.

You Are What You Eat: Mandating Point-of-Purchase Nutrition Information in Georgia Restaurants

Kelsey A. Jones, Roosevelt @ UGA
Dr. Marsha Davis, Department of Health Promotion & Behavior, University of Georgia

The prevalence of obesity in the United States has prompted the U.S. Surgeon General to declare it an epidemic. This alarming trend relates to changing consumption patterns, as Americans increasingly eat restaurant foods that contain more calories, fat, and sodium than at-home alternatives. Georgia—a state with one of the highest levels of obesity-related morbidity—has yet to enact policies to prevent obesity among its citizens. The Georgia Assembly should mandate that restaurants place nutrition information on all menus to improve Georgia consumers' ability to make healthy meal decisions. In addition, the Georgia Division of

Public Health should create a complementary educational initiative; this advocacy program will encourage healthier diets and instruct consumers on how to use this new information effectively. Even health-oriented consumers have difficulty assessing the nutritional value of a restaurant meal, often vastly underestimating its contents. Moreover, this lack of information fails to hold restaurants accountable for the calorie-dense materials they use to prepare foods. Enacting point-of-purchase nutrition labeling legislation would enable individuals to make healthier food choices and compel restaurants to offer meals of greater nutritional value. The motivation for the Georgia legislature lies in the potential annual savings of $2.1 billion spent on the obesity health burden and the favorable public response to similar proposals in other states. Research could examine the relationship between the successful implementation of the policy and weight trends in Georgia. If the policy is found to be effective, the nation could benefit from Georgia's efforts to discourage an obesogenic environment.

Duet of Soprano and Bass Clarinets
Brandon Kaufman
Dr. Roger Vogel, Department of Music Theory & Composition, University of Georgia

Duet for Soprano and Bass Clarinets was written in February 2008 to provide the composer and clarinetist Kim Nogi with a new composition to premiere on their joint recital in April. The mood is cheerful and contrapuntal with the main themes elaborated by both the high and low instruments.

Brandon Kaufman, Soprano Clarinet
Kim Nogi, Bass Clarinet

Hope for the Horn: The Case for the Recognition of Somaliland
Alex Kazer, Roosevelt @ UGA
Dr. Abdulahi Osman, Department of International Affairs, University of Georgia

Since 1991, Somalia has been plagued by famine, civil war, and a complete lack of governance. However, in Somaliland, the autonomous northern region of Somalia, there is peace. Not only has Somaliland avoided the brutal history of tribal warfare that has characterized Somalia, but it has been democratically governed as an independent state since 1991, complete with tribal cooperation and peaceful transfers of power. While Somaliland declared its independence in 1991, it has yet to be recognized by any other state, precluding it from receiving foreign aid and investment and from forging security partnerships with other states. The United States should lead the international community in recognizing Somaliland as an independent state. This paper will demonstrate that recognizing Somaliland will not only yield tangible security improvements and economic benefits to the United States, but it will legitimize Somaliland's style of democracy as a model for the rest of East Africa. The international community continues to place its faith in the Transitional Federal Government, the current Somali administration, in the hopes of maintaining one Somali state, but the TFG has not even been capable of governing Mogadishu. An examination of Somali history will reveal the stark divisions between both states and the impossibility of reconciliation. Several African case studies indicate that Somaliland will not, as many African leaders fear, lead to the Balkanization of Africa and that a strong legal precedence for the division of the Somali state exists.

The Role of Plasminogen Activator Inhibitor-1 (PAI-1) in the Immunopathogenesis of *Plasmodium falciparum*-mediated Placental Malaria
Lauren F. Kelly
Dr. Julie Moore, Department of Infectious Diseases, University of Georgia

Placental malaria (PM) is characterized by accumulation of *Plasmodium falciparum*-infected red blood cells in the human placenta. This leads to maternal anemia and poor fetal outcome including low birth weight and possibly perinatal death. Primigravidae are more

susceptible to the devastating consequences of PM, suggesting the presence of gravity-dependent immunological resistance among malaria-exposed women. PM has been associated with damaging local maternal immune responses, including monocyte infiltration to the maternal placental blood space. An additional common feature of PM is excessive fibrin deposition, an end-product of blood coagulation. The immune factors that are involved in the recruitment and activation of maternal immune cells to the placenta and how this may relate to local hyper-coagulation are poorly understood. It is hypothesized that syntiotrophoblasts, fetal cells facing the maternal blood circulation, secrete these cell mediators as well as pro-coagulants or anti-fibrinolytics, resulting in the influx of maternal immune cells and clotting/fibrin accumulation. To address this hypothesis, placental plasma samples were collected in malaria-endemic western Kenya from parturient women and were stratified according to PM status and gravidity, with other parameters considered, such as the histopathological state of the placenta. The results reveal higher levels of soluble immune factor expression in PM+ primigravidae compared to multigravidae. The levels of plasminogen activator inhibitor (PAI)-1, which is responsible for fibrinolytic inhibition and thus may contribute to the excessive placental fibrin accumulation in PM, are currently under investigation. Furthermore, the relationship of PAI-1 to levels of local soluble immune factors is also of interest.

Eres un Universo de Universos:* Reconnecting With the Human Aspects of Medicine Through Field Experiences on *La Isla de Ometepe

Lauren F. Kelly
Dr. Pamela B. Kleiber, Honors Program, University of Georgia

As an undergraduate premed student preparing for a career in global infectious diseases prevention and management, I lived with and helped administer medical services to Nicaraguan residents on *La Isla de Ometepe* for two weeks in summer 2007. Reconnecting with the most essential and human aspects of medicine, I worked intimately with a Nicaraguan clinical physician as we visited four remote villages. I used qualitative research methods, specifically, heuristics (Moustakas), to interpret my experiences with the *Ometepe* people. Heuristics, a holistic process rooted in identifying with one's surroundings and creating an environment of continual questioning and self-dialogue, deepens self-awareness and illuminates one's connection with the world. My bilingual and visual journal documents my experience on the island, questions my prior assumptions, and details questions I developed in the field. During the four months after I returned, I iteratively reread and analyzed my journal and crafted *Eres un Universo de Universos*, a compilation of developed ideas and specific awakenings that transpired from the resonating themes of my documentation in Nicaragua. The process allowed me to identify particular moments marking personal transformations: the ferry boat ride when I left the world I knew; my severe illness when the people whom I intended to care for took care of me; and the post-trip reflection when I realized the unrivaled values of the experience. In my findings, I describe through my newly developed heuristics lens the persons, places and events as I experienced them during this intensive field experience on *La Isla de Ometepe*.

Usage of Linear Subspaces with Varieties

Tyler L. Kelly
Dr. Elham Izadi, Department of Mathematics, University of Georgia

Algebraic geometry can be defined as the study of solutions of systems of polynomials in an affine or projective space. This discipline has many applications in fields such as Physics, Robotics, and Coding theory. The n-dimensional complex projective space, $\mathbb{P}^n$, can be defined as the set of lines in $\mathbb{C}^{n+1}$, or $n+1$-dimensional complex space. A hypersurface X in $\mathbb{P}^n$ is an irreducible homogeneous polynomial f of degree d, i.e. a polynomial of $n+1$ projective coordinates where each monomial of f has

degree d. Our goal is to classify these hypersurfaces and describe what they look like and what properties they have. To do this, we define the Fano variety associated to X, $F_k(X)$, as the set of k-dimensional linear spaces contained in X. For example, if $k = 1$, we will be looking at projective lines in X. This Fano variety is a subspace of the Grassmannian $\mathbb{G}(k, n)$, the set of k-dimensional planes in $\mathbb{P}^n$. Through a geometric argument, we can cover the Grassmannian with open sets of itself that are equivalent to the complex space $\mathbb{C}^{(k+1)(n-k)}$. This means that the Grassmannian is smooth; hence its tangent bundle of the Grassmannian as well as the Fano variety is well-defined. Analogously, this implies that it also has a well-defined normal bundle and many other properties mathematically make sense in the context of the Fano variety. This lets us classify the original hypersurface X according to these properties. We will investigate these properties and focus on the case of lines in cubics and quartics (degrees three and four, respectively).

Evaluation of Potential Inhalation Hazards of Petroleum-, Synthetic- and Bio-Fuels Using GC/MS Analysis of Vapors under Equilibrium Conditions

Christine M. Kendrick
Dr. Jeffrey Fisher, Department of Environmental & Health Sciences, University of Georgia

The increasing attention and evolving policies concerning future energy supplies necessitates understanding the composition of alternative fuels. Fuels are complex chemical mixtures and with the possibility of switching to unconventional fuels the effects vapors may have on humans need to be known. A comparison of headspace vapor components, the vapor trapped above the liquid fuel in a sealed vial, of five fuel types was carried out using gas chromatography and mass spectrometry. Samples of Jet Propulsion Fuel (JP-8), a Fischer-Tropsch (FT) Synthetic Fuel (S-8), a 50/50 mixture of JP-8 and S-8, a commercial biodiesel, and a conventional diesel fuel were compared. Synthetic or FT fuel is produced in a catalytic reaction in which hydrocarbons are synthesized from hydrogen and carbon monoxide. This process allows petroleum products, synthetic oil and fuel, to be produced from carbon sources other than oil. A preliminary inhalation study of aerosolized JP-8 and S-8 revealed important differences in the hydrocarbon composition of the droplets and vapor phases in the chamber atmospheres. Aromatic hydrocarbons found in JP-8 were replaced with methyl branched isoparaffins and lighter hydrocarbons (C8 - C10) in FT fuel. Headspace vapor results showed a bio-fuel blend of biodiesel and a bio-oil derived from wood chips contained toluene and benzene and some components specific to wood such as Alpha pinene, 2-beta pinene, Limonene, beta-Terpinene, Camphene, 2-methyl furan, and 2,5-dimethyl furan. Such components derived from oils and polymers of plant species may lead to unique exposures compared to petroleum based diesel fuels. These differences in composition mean humans would be exposed to different molecules from each fuel resulting in distinctive health effects. Understanding the composition of each fuel leads to understanding the subsequent exposures which allows appropriate treatment of human health effects and helps create safe occupational exposure levels. Headspace samples of the five fuel types are currently under analysis using Total Ion Content to make a final comparison. Research focusing on JP-8 and diesel exists, providing extensive data from animals and modeling about their exposures. Comparing the composition of various fuel types in the context of inhalation exposures is a new endeavor however. There is data beginning to be collected on emissions of biodiesel and alternative fuels, but there is minimal data on direct vapor exposure which is what workers and producers would be in contact with. Initial results indicate more research is needed to describe the significant molecules in each fuel, the pathways and metabolism of such molecules in the human body, and ultimately the health effects. To gather that data for the various fuel types, these fuels should undergo standardized toxicological evaluations.

Finding the Best Protocol to Homogenize Carbon Nanotubes

Karen S. Kenner
Dr. Marcus Lay, Department of Chemistry, University of Georgia

Carbon nanotubes (CNTs) have many unique physical and chemical characteristics that have made them the focus of intense research in various areas of materials research. These nano-scaled molecular wires are the strongest known material. Furthermore, they also exhibit enhanced electronic properties, enabling new technologies that require lightweight and transparent electronic materials. CNTs are revolutionizing technology in the scientific community, from making stronger combat material for uniforms, to a potential space elevator that would go into outer space. Therefore, the past decade has seen an exponential increase in publications related to CNTs. Although CNTs exhibit many important qualities that make them versatile enough to serve in many different capacities, they have some significant problems that must be overcome before they are ready for widespread use. One major problem with CNT material is that when it is formed, large bundles of CNTs are formed (similar to a bundle of straws stuck together). These bundles must be separated in order for the CNTs to exhibit their desired semiconductive behavior. Sodium dodecyl sulfate (SDS) is a surfactant (soap) that can be used to suspend individual CNTs in aqueous solution, with the aid of sonication. The purpose of this study was to develop a protocol for homogenizing CNTs in 1.0 % sodium dodecyl sulfate (SDS) and investigate the length of individual CNTs while using various sonication powers (watts). Various solutions were mixed, using a sonicator, in increments of 4 watts ranging from 4-24 watts. UV-vis spectroscopy was then used to verify the effectiveness of dispersion. Next, the solution was centrifuged for 30 minutes at 1800 rpm, to remove any remaining bundles. The UV-vis data was collected again and the solution, containing CNTs, was deposited on silane-coated glass. An image was obtained from the deposits on the glass with the use of Atomic Force Microscopy (AFM). The images were used to determine that the best sonication power to homogenize CNTs would be 6 watts. Excessive Sonication was found to damage the CNTs, while insufficient sonication resulted in bundles remaining. Knowing the best sonication power is important to the overall science community because it will ensure that networks are being made to function at the maximum capacity. By sonicating too long or too little the length will vary.

Mutagenesis Analysis of the Chain Length Determination Domain of the *Toxoplasma gondii* Farnesyl Diphosphate Synthase

Noah A. Koon
Dr. Silvia Moreno, Department of Cellular Biology, University of Georgia

Toxoplasma gondii is a protozoan parasite and a major opportunistic pathogen of immuno-compromised patients and of fetuses from recently infected mothers. Drugs used for chemotherapy of toxoplasmosis are not ideal because of their side effects. Farnesyl diphosphate synthase (FPPS) is a key enzyme in the synthesis of isoprenoids and appears to be a potential drug target for chemotherapy. *T. gondii* FPPS (TgFPPS) is inhibited by bisphosphonates, which are pyrophosphate analogs used clinically for the treatment of bone disorders. These compounds also show inhibition of *T. gondii* growth *in vitro* and *in vivo*. Recent work has shown that TgFPPS is a bifunctional enzyme as it can synthesize both the 15-carbon isoprenoid farnesyl diphosphate (FPP), and the 20-carbon isoprenoid geranylgeranyl diphosphate (GGPP). This is different from other FPPSs, which can only synthesize FPP. Because of this functional difference, bisphosphonates with a long side chain are more active against this enzyme than against other FPPSs. The Moreno-Docampo lab has investigated the mechanism by which TgFPPS is able to act as a bifunctional enzyme by using site-directed mutagenesis of the amino acid residues present in the chain-length determination domain of the enzyme. Ten mutant enzymes were produced, expressed and purified. The kinetic characteristics of these

mutants were analyzed revealing that the fourth amino acid upstream to the first aspartic acid-rich domain (FARM) region is essential for activity. Other mutations changed the products formed. These results will help to develop more efficient anti-toxoplasmosis drugs in the future.

Unbiased Isolation of Alpha-Dystroglycan

Andrew F. Kragor, CURO Summer Fellow, CURO Scholar
Dr. Carl Bergmann, Complex Carbohydrate Research Center, University of Georgia

The majority of proteins on the surface of cells are decorated with carbohydrate sidechains, which have been repeatedly demonstrated to effect protein structure, stability, and activity. A specific class of sugar modifications, the O-linked sugars, have been demonstrated to play a significant role in diabetes, muscular dystrophy, leprosy, and most recently, cancer. α-dystroglycan (α-DG) is critical for many interactions of the cell with its environment. As such, it is an outstanding candidate for affecting cellular movement and adhesion, which are central in the development and spread of cancer. The isolation of α-dystroglycan from mouse muscle tissue was accomplished by a non-biased method, using conventional column chromatography that does not differentiate based on glycan structures. The protocol for mouse muscle α -DG was also applied to mouse brain α-DG isolation. α-DG has been previously isolated at the University of Minnesota, but by methods which were specific to certain glycosylations. The method we formulated is proposed to work generally for all species and organ types within those species, regardless of their glycosylation. The protocol is currently being streamlined to create better yields. Another option started is to create an antibody that selects for the peptide backbone of α-DG, again regardless of its glycosylation, and therefore independent of its functionality and tissue source. This is required prior to mapping and structural determination of all the carbohydrate structures on α-dystroglycan. It also sets up a protocol for isolation of α-dystroglycan from mice that have altered forms of O-mannosylation, which seems to be the key carbohydrate chain for functionality, and therefore disease state.

Functional Analysis of the *Magnaporthe grisea* Secretome

Brian T. Laughlin, CURO Summer Fellow, CURO Scholar
Dr. Sheng-Cheng Wu, Complex Carbohydrate Research Center, University of Georgia

Magnaporthe grisea is the causal fungal agent of rice blast disease responsible for the annual loss of 200 million tons of rice output worldwide. Under various growth conditions, *M. grisea* secretes a large number of extracellular proteins (ECPs) that have been proteomically identified. Among these, MgEcp22 and MgEcp23 are exclusively secreted during infection of the plant host, thus may be pathogenicity factors or signal-molecules involved in interactions between the fungus and its plant host. To better understand their roles, the *MgEcp22* and *MgEcp23* genes were cloned into *M. grisea* expression vectors under strong and constitutive promoters. Three completed expression constructs, each carrying the *MgEcp22* or *MgEcp23* gene, were successfully transformed into *M. grisea*. The $(His)_6$- and Myc-tagged MgEcp22H and MgEcp23H presumably secreted into the culture media were examined by Western-blotting, but the results were inconclusive. Additionally, infection analysis of several MgEcp22H- and MgEcp23H-transformed *M. grisea* strains on rice seedlings showed a consistent and significant reduction in total number of infection lesions comparing to those caused by wild-type *M. grisea*. It is possible that constitutive over-secretion of MgEcp22H or MgEcp23H resulted in a stronger immune response by the plant host. Future work will involve quantitative infection assays and microscopic examination of detached rice leaves. The probable formation of protein complexes between MgEcp22H/MgEcp23H, and plant host protein(s) during infection will also be investigated. Such complexes may then be characterized using current proteomics technology. Ultimately, my work aims to reveal

the function of such ECPs so that novel fungicides may be engineered.

The Impact of Low Income Families on the Development of Literacy

Lauren M. Lesso, Susan Hulteen, Christopher Newberry, Kim Mears, Christina Borne, Alex Carson
Dr. Tsu-Ming Chiang, Department of Psychology, Georgia College & State University

The development of emergent literacy is essential to the learning foundation of reading. Emergent literacy is reading and writing skills acquired during the preschool years that serve as a gateway to comprehensive reading in continuing grades. Research has shown that lack of emergent literacy skills places children at a higher risk of developing reading disabilities. Social and cultural contexts are highly influential on the attainment of emergent literacy. Teachers and parents are the ones who provide the ideal reading environment in school setting and at home. The present study, part of a larger study examining children's social development, focused on documenting children's preference in various objects through toy selection. Two hundred and eighty-four children, with ages ranging from 3 to 4, were collected in 3 waves of data from the local head start program during the past 4 years. Children were asked to report their favorite object verbally, followed by pointing at a favorite object from a box containing a book and various toys. The results showed that very few children (girls, 5.1%, 16.7%, 0% and boys 8.3%, 3.2% and 0% respectively) selected books as their favorite object at both ages 3 and 4. The significantly low percentage of children interested in books may indicate a drastic need for reading programs to be implemented as early as preschool to aid in the development of emergent literacy. The implications of how to foster needed literacy programs at the head start programs and gender effects will be discussed at the conference.

Tort Cases in Georgia in the Early 2000s: Tort Abuse Not as Prominent as Portrayed

Rebecca I. Lunceford
Prof. David Mustard, Department of Economics, University of Georgia

A tort is the unlawful violation of a private legal right other than a mere breach of contract. Many have feared recently that tort reform is a necessary action to repair the current system of unreasonably high and frequent punitive damages awarded to greedy plaintiffs. These high damages create incentive for more filings of tort cases and possible abuse of the legal system. Research from data collected through the University of Georgia Law School shows that this is not necessarily the case. The data contain tort information from all the cases filed from the years 2004 to 2006 in both Superior and State courts for several counties in Georgia including Bibb, Cobb, Fulton, and Gwinnett. The data collected consists of many elements from the case files including length of time it took to dispose of the case, the type of tort filed, the type of damages requested (punitive or compensatory), how the case was disposed of, and if the case did go to trial, what type of damages, if any, were awarded. The data show that at least in Georgia, the popular belief of unjustifiably high damage awards and a strong upsurge in cases filed is not the reality. The large majority of tort cases filed are simple automobile collisions. The percentage of tort cases that actually go to trial are extremely low, and out of the small amount of cases that do go to trial, a small portion of those are awarded punitive damages. Georgia's current tort system appears to operate well with little need for powerful and immediate reform.

Inhibition of the CaaX Proteases Rce1p and Ste24p with Peptidyl (Acyloxy)Methyl Ketones (AOMK) and Quinolinol Based Molecules

James P. MacNamara, CURO Summer Fellow
Dr. Timothy Dore, Department of Chemistry, University of Georgia

Ras is a GTPase involved in growth pathways and a common proto-oncogene with a CaaX motif, where "C" is cysteine, "a" is an aliphatic amino acid and "X" can be a variety of amino acids. Rce1p participates in a three-step activation of Ras by cleaving the -aaX amino acids from the C-terminus. By inhibiting Rce1p, mutated Ras activation could be halted in cancer cells, preventing any further growth. Two series of molecules are being synthesized with the intention of inhibiting Rce1p and a yeast equivalent Ste24p: peptidyl (acyloxy)methyl ketones (AOMKs) with analogs of five dipeptide backbones and quinolinol based analogs. By synthesizing and assaying these compounds against Rce1p and Ste24p, the inhibitory profile of the molecules can be gained and more information about the active site of Rce1p can be established. Ste24p is a zinc-metalloprotease with a known active site, and therefore molecules with similar inhibitory abilities for both enzymes may reveal Rce1p proteolysis mechanism. By varying the second amino acid and the benzoate, these analogs could inhibit RCE1p and ste24p more effectively. Of the AOMKs, Z-Phe-Arg was the most potent backbone, with the most potent molecule inhibiting 69% activity of Rce1p and 97% of Ste24p. Because the leaving group ability does not correlate with inhibitory abilities, it is more likely that the AOMKs work through non-covalent inhibition. The quinolinol based compound strongly inhibited both Rce1p and Ste24p and analogs are currently being synthesized and tested to improve its inhibitory ability and determine its mechanism.

The Joys of Hunting: Analyzing the Relationship Between the Small Hunt Mosaic of Piazza Armerina in the Architectural Space of the Hiemale Triclinium

Lillie Ann M. Madali
Dr. Asen Kirin, Department of Art History, University of Georgia

The Villa Filosofiana at Piazza Armerina is an early 4th Century Roman estate on the island of Sicily which houses a Small Hunt floor pavement in the hiemale triclinium or winter dining room. This floor pavement highlights the most important moments of a hunting excursion, among them a scene of sacrifice to Diana the goddess of hunting, a banquet scene, a stag hunt and a boar hunt. A reconstruction of the relationship between the Small Hunt floor pavement and the hiemale triclinium promotes a new art historical understanding. A comparative analysis of the iconography associated with hunting in other art works like the Sevso Treasury and the Dunbabin Oaks Hunt floor pavement redefines its ritual significance and its relationship with the architectural space of the hiemale triclinium. The Small Hunt floor pavement exhibits the evolution of the visual culture associated with the civic ritual of dining. What is significant is the progression and transformation of triclinium iconography from the Second Century to the Fourth Century as it becomes more abstracted. Here we see the creation of the notion of the triclinium arrangement since it has become integrated so deeply within the visual culture related to dining. By highlighting similarities with past mosaics and relating it to the philosophical ideals contemporary to the Villa, there surfaces an understanding of the triclinium arrangement's significance as it promotes the structure's purpose as a true Villa Filosofiana conducive to the intellectual pursuits of the wealthy.

Female Choice and Male Mating Success in *Drosophila* Sexual Selection

Margaret C. Madean & Sohyun Kwon
Dr. Wyatt Anderson, Department of Genetics, University of Georgia

Sexual selection is widely observed in nature. Females choose their mates based on courtship displays and sensory signals. In *Drosophila melanogaster* sensory information is exchanged during courtship. We hypothesized that (1) there is variation in male mating success; (2) males with a higher mating frequency will mate more quickly; and (3) pheromone levels will be greater in males with high mating frequencies. The following experiments were conducted to test these hypotheses. Female choice was observed by placing fourteen *Drosophila melanogaster* virgin males in a glass chamber, adding single virgin females, and then recording female mate choice. Males who mated the most and males who did not mate were collected for further analysis. Each male was placed with a virgin female in a vial. The mating speed of these couples was measured, and the males were individually analyzed for pheromone levels. The data showed high female selectivity, with females mating with certain males multiple times, while choosing not to mate with some males at all; this constitutes non-random mating. Mating frequency and mating speed show a negative correlation, so that males with a short mating speed mated more frequently. We are currently comparing pheromone levels in males with low and high mating frequencies, and we are also comparing *Drosophila melanogaster* with *Drosophila pseudoobscura*. This data will help us to understand the interplay between female mate choice, male mating speed, and pheromone levels—and to reach a fuller understanding of sexual selection in *Drosophila*, which is a key element of evolution.

Eliminating the Road Test in License Renewal Programs

Halina Maladtsova, Roosevelt @ UGA
Dr. Christopher Cornwell, Department of Economics, University of Georgia

While elderly drivers and teenagers are the two demographics most susceptible to automobile crashes, state and federal driving laws have focused primarily on curbing the dangers of teenage driving. Economists expect the number of drivers ages 75 and older to triple to 33 million by 2050, an increase deserving the attention of lawmakers. Efficient license renewal programs will prevent poor drivers from harming themselves and others on the road. Some states have passed laws that affect license renewal procedures and aim to prevent senior citizens from driving if they are no longer physically or mentally capable. A careful analysis of data provided by the Fatality Analysis Reporting System reveals that the road test requirement implemented in Illinois and New Hampshire is an ineffective deterrent to elderly crashes and fatalities. Analyses of the effects of implementing a road test in Illinois and repealing it in Indiana confirm the ineffectiveness of the test as part of the two states' license renewal programs. In order to make sure that no other state implements the ineffective road test and wastes valuable resources, this policy proposes making Department of Transportation funding contingent upon states not implementing the road test as part of their license renewal programs. The paper also calls for increased funding to states that implement vision tests and in-person renewal requirements, both of which have been shown to identify poor drivers. Such laws may be criticized as discriminatory, but their purpose is not to prevent the elderly from driving, but to promote safety.

Dialect Perceptions of Spanish Speakers in Georgia

Sharon A. McCoy, CURO Apprentice
Dr. Chad Howe, Department of Romance Languages, University of Georgia

Since the 2000 census, the Spanish speaking population in Georgia has increased by over 300 percent, creating a unique bilingual environment within the state. In order to investigate this language setting, I am collecting data regarding social factors such as age, amount of time spent in the United States, country of origin, and social networks, that affect the use and perceptions of Spanish held by native Spanish speakers within Georgia. A questionnaire will first be distributed to the Hispanic populations in the cities of Athens and Roswell, Georgia. It asks respondents to rate their views of Spanish by evaluating the Spanish spoken by their elders, peers, and by themselves on scales of "correctness" and "pleasantness." In addition, respondents provide information regarding the use of Spanish in comparison to the use of English by Hispanics and by themselves in specific social situations, such as the home, church, work, or school. The results of the questionnaire will later be statistically analyzed to observe the effects of these social and demographic factors on the perceptions of the Spanish language and the development of Georgia's bilingual climate. I hypothesize that, of these factors, the most influential are the age and community networks of respondents, followed closely by their duration of stay in the U.S. In the future, I wish to continue this investigation among other cities and regions of Georgia to analyze how these perceptions and social variables are affecting not only the speakers, but also the preservation of the languages themselves.

Polyphenolic Antioxidants in Unprocessed Traditional Diets: Wild-Crafted Acorn Flour as a Dietary Staple

Amy M. McGoff & Harold Jackson
Dr. James Hargrove, Department of Food & Nutrition, University of Georgia

Polyphenolic phytochemicals are antioxidants that confer health benefits including reduced risk for cardiovascular disease, metabolic syndrome and certain cancers. The hypothesis was tested that acorn flour, a staple in many unrefined, traditional diets, contains higher polyphenolic levels than most modern foods. Acorns from 15 oak species found in the UGA Campus Arboretum were surveyed for polyphenolic and tannin content to estimate the unknown upper range of human polyphenolic consumption. Acorns from the black oak (*Quercus velutina*) and white oak (*Quercus alba*) were selected for further study. Initial total phenolic content and antioxidant capacity of the white and black oak acorns were measured. Due to high tannin content, acorns are normally leached with water and dried prior to consumption to remove the protein precipitating capacity. Thus, a radial diffusion assay was applied to quantify loss of tannins during leaching. Dried flour made from black and white oak acorns contained 40 mg/g and 15 mg/g of polyphenolic compounds, respectively, a substantial amount compared to a 1-12 mg/g range for whole wheat flour, berries and several nuts. Pomo Indians of California obtain 25-50% of their calories from acorns, thus approximately 200-400 g acorns/d. If the acorns consumed by the Pomo people contain similar amounts of polyphenols as the studied samples, diets in some traditional cultures provide more than 3,000 – 16,000 mg phenolics/d, demonstrating the upper range for human consumption of polyphenols. In comparison, the average present US dietary intake of polyphenolic antioxidants is less than 1/6 the amount consumed by some traditional cultures.

The Case for Minor Access to Emergency Contraceptive

Catherine P. Mencher, Roosevelt @ UGA
Dr. Monica Gaughan, Department of Health Policy & Management, University of Georgia

In 2006, 82% of all teen pregnancies were unplanned, and among all age groups, teens have the largest proportion of pregnancies ending in abortion. Despite such indicting statistics, the FDA still requires minors to have a prescription for Emergency Contraceptive (EC), the only contraceptive effective after unprotected sex. In 2003 the FDA banned minor over-the-counter (OTC) access to EC, and last year teenage birth rates rose for the first time in fifteen years. A section of the FDA ban; however, reserves the right of states to allow minor access to EC. This paper will evaluate the accuracy of FDA reasoning behind limiting minor access and propose the creation of a Georgia law allowing minors OTC access to EC along with a concurrent ad campaign to address the major issues surrounding this law. A case study will be preformed to evaluate minor's access to EC in Athens-Clarke County and generalize the found results to the entire state of Georgia. The policy calls for expanding funding to the Georgia Health and Human Services subcommittee to fund an EC task force. The task force will conduct a comprehensive study establishing both the availability and knowledge of EC to teenagers. Following the study, vigorous public campaigns throughout Georgia will explain to teens how to use and access EC and highlight the general public's misconceptions about EC—specifically that EC causes an abortion and would increase teen sex.

Effects of Social Environment on Women's Participation in Computer Science

David T. Mitchell, CURO Apprentice
Dr. Victoria Plaut, Department of Psychology, University of Georgia

For decades women have fought to become more active members in many areas of employment and higher education. Whereas women have achieved successful integration in fields of study including law and medicine, there still exists a noticeable gender gap in other fields, such as computer science. According to the National Science Foundation, in 2004 women only earned 25% of all computer science BAs, a number that has been consistently decreasing. How do we explain why females at every level of our schooling are less attracted to computer science than their male peers? The goal of our research was to gauge the effects the *environment* plays on women's perception of computer science by exposing them to certain "masculine" characteristics of computer science (e.g. geeky objects such as Star Trek posters, soda, comic books) in a work environment vs. more neutral characteristics (e.g. non-geeky objects such as art posters, water bottles, general interest magazines). Following exposure, men and women were asked multiple-choice and open-ended questions about their interest in computer science and feelings of social fit. The results illustrated, for example, that jobs with more "masculine" characteristics were more frequently associated with computer science and more preferred by men than women. Results also suggest these effects are due largely to women's lack of perceived fit with masculine environments. Importantly, the research conveys the implicit effects of the environment on decision-making, although further studies (some in process) will be needed to better decipher the influence of varying deterrents on women concerning the field of computer science.

Is A Hepatitis E-Like Virus Found In Cats and Does It Cause Hepatitis?

Jessica L. Mobley
Dr. Elizabeth Howerth, Department of Pathology, University of Georgia

Hepatitis E virus (HEV) is an enterically transmitted non-enveloped, positive single stranded RNA virus in the new virus family Hepeviridae. The virus has only been identified in humans, chickens, and pigs. It is endemic in humans in developing countries with sporadic disease occurring in developed countries. Hepatitis seen in endemic cases in humans is similar histologically to an entity of unknown

cause in cats known as chronic lymphocytic cholangitis. Clinical signs in cats with this condition are very similar to those seen in HEV positive humans and swine. The objective of this study is to screen cats for the presence of a HEV and correlate viral presence to histopathologic evidence of cholangiohepatitis. We hypothesize that cats have a HEV that causes cholangiohepatitis. Bile and intestinal contents from cats submitted for necropsy at the College of Veterinary Medicine are being screened for HEV using a nested PCR technique that uses degenerate primers designed to amplify HEV from humans, pigs, and chickens. Any positive results will be correlated with liver histopathology in the same cat to assess the potential of the virus causing hepatitis. To date, there have been no PCR positive samples. Expansion of this project to include serologic detection of infected cats may be beneficial, as serology has been found to be more sensitive in detecting HEV infected humans due to transient viral shedding.

Oxygen Delivery After Ischemia in Active and Inactive Subjects

Michael D. Mogill
Dr. Kevin McCully, Department of Kinesiology, University of Georgia

Recovery of oxygen saturation after ischemia has been used as an index of oxygen delivery in patient populations. The purpose of this study was to test whether active healthy subjects have faster rates of oxygen delivery compared to inactive healthy subjects. Active subjects (21.8 $\pm$ 1.9 yrs, mean $\pm$ SD, n=8), who participate in aerobic exercise three or more times a week, were compared with inactive subjects (20.8 $\pm$ 2.4 yrs, n=5), who participated in aerobic exercise one day a week or less. Oxygen-heme saturation was measured in the medial gastrocnemius using the continuous light dual-wavelength near infrared spectroscopy (NIRS) device. Ischemia was produced by rapidly inflating a cuff (1-2s) to suprastolic pressures (>220mmHg) for four minutes. Subjects were allowed to recover for three minutes following cuff deflation. The time to ½ recovery of oxygen saturation was measured, assuming an exponential recovery. Active subjects had a shorter recovery time (9.8 $\pm$ 1.8 s) following ischemia compared to inactive subjects (13.6 $\pm$ 4.9 s). The difference between groups was statistically significant with P=0.045. The data supported the hypothesis that recovery of oxygen saturation was ~40% faster in active versus inactive young healthy subjects, consistent with known metabolic and vascular adaptations to endurance training. This suggests that the NIRS ischemic recovery test is capable of detecting training induced changes in a healthy population.

Expression of Glycerophospholipids in Rat Brain after Cocaine Withdrawal

Prashant Monian, CURO Summer Fellow
Dr. Brian Cummings, Department of Pharmaceutical & Biomedical Sciences, University of Georgia

The purpose of this study was to investigate the effects of cocaine withdrawal on glycerophospholipids in the hippocampus, frontal lobe and cerebellum of rat brains. Rats were injected intraperitoneal once daily with saline or cocaine (15mg/kg) over 4 days in a conditioned place preference (CPP) protocol prior to a withdrawal period of either confinement (abstinent) or injection of saline (extinguished). After 4 days of abstinence or extinction, a reinstatement CPP test was given in which a 5th cocaine injection was delivered. Tissues were collected 1 week following this final cocaine exposure, lipids isolated using Bligh-Dyer extraction and analyzed by electrospray ionization-mass spectrometry. Phospholipid profiles of the hippocampus and frontal lobe were similar in control rats, while the cerebellum expressed lower levels of 32:0 phosphatidylcholine (PtdCho) and 36:4 PtdCho. However, the cerebellum expressed lower amounts of 34:2, 36:3 and 36:1 PtdCho. The expression of sphingomyelins (a specialized lipid abundant in brains), were higher in the cerebellum than the hippocampus or frontal lobe, especially 24:1 and 26:4 sphingomyelin. Cocaine withdrawal using either the abstinent or

extinguished protocols did not alter sphingomyelin expression. The abstinent protocol resulted in lower levels of 14:0-16:1 and 18:0-20:4 Ptdcho in the hippocampus. In contrast, no changes in phospholipid expression were detected in either the frontal lobe or the cerebellum. Decreased expression of phospholipids in the hippocampus correlated to increased levels of 16:0- lysophospholipids. These data support the hypothesis that the expression of phospholipids in the hippocampus is altered during cocaine withdrawal in a rat model of addiction.

Potential Economic Impact from Zeolite Use in Uganda

Mia Catherine Morgan
Dr. William Kisaalita, Department of Biological & Agricultural Engineering, University of Georgia

In a previous study at the University of Georgia, the mineral zeolite was successfully identified through samples collected within geologically favorable areas of Uganda. This discovery is significant because it is the same mineral currently being used in the development of a dairy cooling system for smallholder Ugandan dairy farmers. The mineral was located in the areas surrounding the Manapha River and Mount Elgon and was identified as the type of zeolite, analcime. The cooler technology utilizes this type of zeolite for its unique adsorption capacity, and the analcime located in Uganda showed absorption potential greater than the leading commercial source available. Remarkably, this mineral is also used in several other industries, including many specifically advantageous to developing country economies such as water filtration, animal feed supplements, and fertilizers. The goal of this research project is to determine the exact economic and industrial growth potential through the use of zeolite in Uganda. Eight weeks during the summer of 2007 were spent in Uganda interviewing and collecting data on the current economic standing of specific industries, such as animal feed, water, and dairy. This data examined along with information on current uses of zeolite will be used to show that utilizing the zeolite source in Uganda is economically advantageous for the country.

Creation of a Transposon Library in *Francisella tularensis* Strain LVS

Diana Murro
Dr. Russell Karls, Department of Infectious Diseases, University of Georgia

Tularemia is a serious infectious disease of small animals and humans caused by *Francisella tularensis*. *F. tularensis* subspecies *tularensis* is the most virulent subspecies to humans. The Live Vaccine Strain (LVS) is derived from *F. tularensis* subspecies *holarctica*. LVS is avirulent in humans, but can still replicate in macrophages and cause disease in mice. Transposons, or mobile genetic elements, will be utilized to create a transposon mutant library in LVS. A transposon vector that contains genes that code for resistance to the antibiotic hygromycin and expression of green fluorescent protein (GFP) has already been created. This transposon vector will be used to produce a transposome which will be forced into the *F. tularensis* LVS by electroporation. Bacteria from colonies that grow on medium containing hygromycin will be collected. Those that express GFP are likely the result of transposition and will be stored to create a library of mutants. In future research, this mutant library will be screened for those that cannot survive in macrophages. The location of the genes disrupted by insertion of the transposon will be identified. The identity of the genes that impair survival of LVS in macrophages should help to understand the mechanisms by which *F. tularensis* escapes killing by the host and may aid in the creation of a more effective tularemia vaccine.

Investigating the Role of Corticotrophin Releasing Factor 1 Receptors (CRFR1) in Stress-Induced Weight Loss

Neil D. Naik, CURO Summer Fellow
Dr. Ruth Harris, Department of Food & Nutrition, University of Georgia

Most people who lose weight through diet and exercise regain the weight within five years. In contrast, mice exposed to repeated restraint stress (RRS: 2 h in restraint tube on each of 3 consecutive days) lose weight and do not return to the weight of non-stressed controls after restraint ends. Stress increases expression of corticotrophin releasing factor (CRF) which activates the hypothalamic-pituitary-adrenal axis, induces anxiety-type behavior, and inhibits feeding. Mice that did not express CRFR1 (knockout), normal littermates (wildtype), and adrenalectomized wildtype (ADX) mice were used to test the role of CRFR1 in mediating the long-term reduction in body weight of RRS mice. Half of the mice from each group were subjected to RRS. Body weight and food intakes of all of the mice were recorded before, during and for eight days after RRS. The mice were then subjected to two anxiety-type behavior tests: an elevated plus maze and a light-dark chamber. The CRFR1 knockout RRS mice, unlike the wildtype and ADX RRS mice, did not lose a significant amount of weight during stress and exhibited less anxiety-type behavior, compared to their controls. These results suggest that CRFR1 are important in mediating both anxiety-type behavior and a long-term reduction in body weight of stressed mice. It is possible that a continuously elevated state of anxiety contributes to the reduction in body weight. Identifying mechanisms that cause these changes in RRS mice may lead to development of strategies that allow people who lose weight to maintain the weight loss.

The Role of KIT-Ligand in Enrichment and Differentiation of Germ-Like Cells in Human Embryonic Stem Cell Cultures

Muktha S. Natrajan, CURO Apprentice
Dr. Steven Stice, Department of Animal & Dairy Science, University of Georgia

Primordial germ cells (PGCs) are important precursor cells that undergo differentiation to become sperm and can potentially be derived from human embryonic stem cells (hESCs). This offers a new tool to understand human germ cell differentiation, signaling pathways and may lead to fertility treatments. Kit-Ligand (KITL) is a signaling factor that is active during embryogenesis which affects germ cell differentiation, proliferation and inhibits apoptosis. KITL is known to encourage spermatogenesis and initiate meiosis. This signaling factor is found in a soluble or membrane-bound form, depending on the RNA splicing around exon 6. The objective of this study was to determine the effect of the presence and absence of the soluble and membrane-bound KITL forms on enrichment and differentiation of germ-like (POU5F1+ DDX4+) cells from hESCs. BGO1 (XY) hESCs were maintained on mitotically inactivated mouse embryonic feeder (MEF) layers in 20% KSR stem cell media, at 37°C and 5% $C0_2$. Cells were manually passaged to maintain pluripotency. Germ-like cells were differentiated on MEFs with soluble and membrane-bound KITL, soluble KITL only, membrane-bound KITL only, and without soluble and membrane-bound KITL for 0, 3 and 10 days without passaging. Cells were fixed and analyzed by immunocytochemistry or flow cytometry. RNA was collected and analyzed by qRT-PCR. We expect that differentiated hESC cultures grown in soluble or membrane-bound forms of KITL to show decreased enrichment and differentiation relative to cultures where KITL in both forms is present. Complete knockout of both forms is expected to result in complete loss of enrichment and differentiation.

The Roles of Non-Homologous End Joining Repair Proteins in Non-B-DNA Structure Induced Genetic Instability

Nithya M. Natrajan
Dr. Karen Vasquez, Department of Carcinogenesis, University of Texas
Dr. Mary Bedell, Department of Genetics, University of Georgia

DNA structure is a critical element of its function. B-DNA is the most common, right-handed helical form of DNA. The sequences that form some non-canonical (non-B) structures have been mapped to translocation breakpoints in Burkitt's lymphoma, implicating these structures in cancer etiology. In previous work, we have shown that certain types of non-B DNA structures are mutagenic in mammalian cells. For example, Z-DNA (left-handed DNA) formed in CG repeats has been shown to induce large-scale deletions and complex rearrangements, which result from DNA double strand breaks (DSBs) induced by this structure in mammalian cells. However, in bacteria, small-scale expansions and deletions are much more common within this repeat. The inconsistency in the mutation spectrum between bacterial and mammalian cells may be a result of how DSBs are repaired. Mammalian cells predominantly use non-homologous end joining (NHEJ) to repair DSBs and bacteria utilize homologous recombination (HR). While HR is an error free type of repair, NHEJ often causes mutations. In this study, we determined the Z-DNA induced mutation frequencies in HR proficient, HR deficient ($RecA^-$), or HR deficient/NHEJ proficient ($RecA^-$ or $RecB^-$ and $Ku^+/LigD^+$) bacterial strains. The $RecA^-$/NHEJ deficient strain and the $RecB^-$/NHEJ proficient strain had a higher mutation frequency than the HR proficient strain. The $RecB^-$/NHEJ proficient strain had ~20% large-scale deletions and 80% small-scale deletions and expansions. This suggests that, while the differences in DSB repair appear to affect the mutation spectrum and frequency, it is not the only reason for the disparities.

Genetic Studies on the Roles of KITL in Regulating Germ Cells in Mice

Natalie A. Nesmith, CURO Summer Fellow
Dr. Mary Bedell, Department of Genetics, University of Georgia

Kit ligand (KITL) and its receptor KIT are required for the development and proliferation of germ cells, melanocytes, and hematopoietic cells in humans, mice and many other vertebrates. Of particular interest in our lab is the role of KITL in the differentiation and development of germ cells. Using various tissues and staining methods, the roles of KITL in primordial germ cells (PGCs) and later germ cell forms were investigated in mice to elucidate more clearly their localization patterns and to determine more fully the roles of cytokines in germ cell development. We have optimized protocols by determining favorable antibodies, their combinations, and concentrations used in the staining of sectioned tissues. Of the antibodies that were markers for PGCs and were tested, eight were found to work properly. These included α-SSEA-1, α-E-cadherin, and five different α-KIT antibodies. These optimizations allowed the collection of results that confirmed published results about KITL expression in various tissues including the gonads, neural tube, skin and the wolffian duct. The results also revealed some novel aspects of KITL localization including KITL within PGCs and its presence during development of sertoli cells of the testis. In conjunction with this project of KITL localization was one that included the sectioning, staining, and compiling of information on the positioning of PGCs in the 43R mutant line. Based on previous studies of PGCs characterized in 43R mutants, there was a suggestion that these mutant embryos exhibit ectopic expression of PGCs. But from the collected results, ectopic PGCs expression was not as pronounced as originally hypothesized. More tests need to be done in order to gather more specimens and information concerning the misdirected cells.

The Effects of Alcohol Abuse on Antisaccade Performance

William T. Oliver
Dr. Jennifer McDowell, Department of Psychology, University of Georgia

Previous research on alcohol and its effects on cognitive function have shown marked impairments in ability to inhibit behaviors. Habitual alcohol use is thought to impede executive control and overall cognitive efficiency as measured by simple perceptual tasks. Studies in persons engaged in habitual alcohol use have shown significant impairments in both reaction times and inhibition tasks. This suggests that there will be a positive correlation between alcohol use and antisaccade error rate, and in alcohol use and eye movement reaction times for correct antisaccade trials. Antisaccade tasks, which require rapid eye movements to the mirror image location of a peripheral stimulus, will allow for reaction time and behavioral inhibition to be measured simultaneously. In order to test this hypothesis, undergraduate participants were tested using a standard alcohol assessment interview (CDDR), recording such variables as frequency, duration, and amount of use. Following each interview participants completed antisaccade tasks in which error rates and response times for correct antisaccades were recorded on a trial by trial basis. Score distributions for both the substance abuse screening and antisaccade task performance were made, and the upper and lower portions of the distributions were compared. It is expected that the current study will yield positive correlations between alcohol abuse and poor antisaccade task performance. Significant correlations between the two could lead to a greater understanding of the cognitive impairments associated with alcohol use and provide valuable information for future studies concerned with localizing the regions of the brain impaired by habitual alcohol use.

From Page to Stage

Opera Ensemble
Prof. Frederick Burchinal, Director and Department of Voice, University of Georgia
Prof. Gary DiPasquasio, Pianist/Music Director and Department of Voice, University of Georgia

Performing opera successfully is a complex process. First, the singer must analyze the written music and attempt to understand the composer's intentions. Then the performer's own creative sense must transform the music on the page into a living, breathing, moving structure—recreating each time a new and vibrant performance for the audience to enjoy. For the CURO Symposium, the UGA Opera Ensemble will demonstrate this process by offering the "plain" version, as seen on the score's page, and then transforming it into the live "painting" or "sculpture" that moves the audience. To demonstrate the role of the artist in the development of a fine performance, we will then offer two different interpretations of the same music, underlining the need for each artist to be an active participant in the creative process. We hope that listeners will be inspired to discover the hidden messages that every composer offers in his or her musical "blueprint," and that they will explore their own world of choices and imagination.

Jason Blanton, Bass-Baritone
Ben Dawkins, Baritone
Andrew Frazier, Baritone
John Ford, Tenor
Danielle Granati, Soprano
Kathryn Sabol, Soprano
Ronaldo Steiner, Baritone
Megan Tucker, Soprano/Dancer
Kristen Vanderoef, Mezzo-Soprano
Brett Vogel, Bass
Katherine Walters, Soprano
Chloe Zeitounian, Soprano/Dancer

The Homeric Lineage of Lautaro in Ercilla's *La Araucana*

Victor M. Orellana, CURO Summer Fellow, CURO Scholar
Dr. Nicolás Lucero, Department of Romance Languages, University of Georgia

Within the highly structured literary periods of the European Renaissance and the Spanish Golden Age, Alonso de Ercilla relied heavily on imitation of classical form to both legitimize and inspire the workings of his poem, *La Araucana*. As a part of the fiercely competitive body of work accompanying the colonial movement through the New World, this aspiring Renaissance epic was expected to adhere to very specific ideals for the church, the Spanish crown, and the highly biased audience across Europe that would be judging it. Therefore, to sell the idea of a serious threat against the Spanish conquistadors, Ercilla used individual heroes to raise the opposition to epic proportions that could feasibly hinder such a superior military force. Furthermore, he employed the virtuous Hector from Homer's *Iliad* in his character of the Mapuche war-chief Lautaro to elevate him to formidable stature, linking the two heroes through epithet, similar trials of love at war, and their ultimate downfalls through hubris. Read within this context, Ercilla's challenges to contemporary archetypes and the prejudices of his audience become increasingly more clarified, especially those regarding the image of the ineptitude and barbarism of the natives of the New World. Additionally, it helps establish a link between *La Araucana* and the secondary epic tradition started by Lucan's *Pharsalia*, offering further explanation both for commonplace criticisms of the poem's structure and for the arguable digression of the poem from its boldly-stated mission of Spanish glorification.

Reducing and Rethinking Recidivism

Terry L. Palmer, Roosevelt @ UGA
Dr. Mark Cooney, Department of Sociology, University of Georgia

Since the landmark cases *Kent v. United States (1966)* and *In Re Gault (1967)*, the juvenile justice system has taken a punitive stance towards sentencing that focuses on adjudicating juveniles with increased jail time. This focus however, neglects the reformation of the juvenile's epistemology. According to a 2006 Georgia Department of Juvenile Justice Report, the results of the current focus have allowed the juvenile recommitment rate to steadily increase over the last eight years to forty percent. If the current, conventional system of adjudication is continued, the US is likely to experience continued growth in both juvenile crime and recidivism. Through an extensive secondary analysis of the literature, this paper illustrates that restorative justice, specifically the victim-offender model, is more effective at preventing recidivism than the current punitive system. This paper proposes that Georgia should adopt sections four through eight of the Australian Crimes Act of 2004, a legislative bill that will standardize the juvenile justice system and involve the community and the victim as active participants in seeking unique adjudication for the crime committed. A restorative justice system will emphasize a unique sentence for each offender that will accurately influence his/her way of thinking so as to affect his/her future actions. Supported by the results of case studies in Australia, Arizona, and New Zealand, this legislation will significantly reduce the recidivism rate for juveniles in Georgia.

Development of a Biocontrol Agent for Chinese Privet, *Ligustrum sinense*

Tulsi Patel
Dr. Scott Gold, Department of Plant Pathology, University of Georgia

Ligustrum sinense, commonly known as Chinese Privet, is an exotic invasive shrub that invades millions of acres of land in the southeastern United States. Although Privet spreads rapidly

and limits the growth of more-important native species, there is no efficient mechanism to control it. Therefore, the purpose of this project is to develop a cost effective biocontrol agent for Privet. This goal may be achieved by creating a fungal pathogen that secretes large amounts of an amino acid that is detrimental to Privet. The first step in finding such a fungal pathogen is to identify a toxic amino acid. Tests in which Privet plantlets were treated with eight different amino acids showed that methionine and lysine were both toxic to Privet. With this information, the next step is to create a mutant fungal pathogen that secretes large amounts of one of these inhibitory amino acids. To do this, strains of fungi have been isolated from 14 cuttings of the Privet plantlets used in this project. 10 of these strains have been identified as *Trichoderma* species by amplifying and sequencing the ITS region of their rDNA. One of these *Trichoderma* strains will now be randomly mutated in the presence of UV rays. A mutant colony that secrets high amounts of methionine or lysine or both will then be isolated using auxotrophs and tested as a potential pathogen. If successful, this project will provide an effective biocontrol agent for Privet and a model that could be used to control other exotic weeds.

Generating Uniform Proliferation of Neuroprogenitor Cells

Tulsi Patel, CURO Summer Fellow
Dr. Steven Stice, Department of Animal & Dairy Science, University of Georgia

Human embryonic stem cells are pluripotent cells that have the potential to differentiate into all cell types found in the human body. The Stice Lab has successfully derived neuroprogenitor cells, which can be further differentiated into neurons, from human embryonic stem cell lines. However, under current conditions, differentiated cell cultures are not completely pure. Therefore, the purpose of this study is to elucidate exactly what factors are important for the proliferation and uniform differentiation of neuroprogenitor cells into motor neurons. The media currently used for cell proliferation comprises of neurobasal media supplemented with B27, Leukemia Inhibitory Factor, Fibroblast Growth Factor 2, and L-glutamine. All of these are defined components except B27, which is composed of a defined supplement, N2, that can be bought separately, and other anti-oxidants and factors. In order to maintain uniformity in cell culturing, the significance of the unknown anti-oxidants and factors must be determined. To this effect, experiments in which neuroprogenitor cells were grown in N2 supplemented neural basal media with various concentrations of B27 ranging from 0 to 1XB27 were performed. Preliminary results show that cells die in the absence of B27, indicating that the other components are essential for cell survival. However, a concentration of 0.5X B27 is sufficient for proliferation. More experiments will be performed with combinations of different factors to determine exactly what components of B27 are necessary. By completely defining the culture media, this study will refine and accelerate neural cell culturing, thereby making more cells available for further biomedical research.

The Application and Adaptability of N.A. Rimsky-Korsakov's Orchestration Techniques Across National Styles in Orchestral Program Music

Laura C. Patterson
Dr. David Haas, Department of Musicology & Ethnomusicology, University of Georgia

Nikolai Rimsky-Korsakov’s music has come to represent Russian musical nationalism. His distinctly recognizable sound is achieved through a unique approach to orchestration that differed in many ways from the techniques used by many German and Western European composers of the time. These techniques were versatile enough to allow Rimsky-Korsakov to create not only a “Russian” style in his music, but also other national styles. Rimsky-Korsakov’s role as a composer and hugely influential teacher led to the utilization of his orchestration methods in other composer’s works. Even students who studied with Rimsky-

Korsakov for a very short period of time, such as Ottorino Respighi, were able to absorb his orchestration techniques and apply them to their own music. Because little scholarship exclusively explores Rimsky-Korsakov's orchestration style, this project seeks to show the relationship between Rimsky-Korsakov's *Principles of Orchestration*, his pedagogical orchestration text, and his own works. Specifically, analysis will focus on identifying Rimsky-Korsakov's unique approach to orchestration as outlined in *Principles of Orchestration* in three compositions of varying national styles. Because *Capriccio Espagnol, Scheherazade,* and *Russian Easter Overture* are impressionistic orchestral pieces and not operas, the orchestration is unimpeded by subservience to a specific dramatic plot or libretto. This project will also show that Rimsky-Korsakov's orchestration techniques are recognizable in Ottorino Respighi's *Feste Romane*, the last work in his "Roman Trilogy." In each piece, the distinct national musical traits will be identified followed by an analysis of how the versatility of Rimsky-Korsakov's orchestration methods helped to achieve each different national style.

Behavioral Effects of Navigate® on Paedomorphic Mole Salamanders, *Ambystoma talpoideum*

Amanda C. Perofsky
Dr. John Maerz, Department of Wildlife, University of Georgia

Over $10 million is spent annually in the U.S. to control invasive aquatic plants for game fish management and native species habitat management. One concern about application of herbicides for controlling aquatic plants is their effect on non-target species. 2,4-dichlorophenoxy acetic acid butoxyethylester, commercially available as Navigate®, is the most commonly used aquatic herbicide in the U.S. Few studies have investigated the effects of exposure to Navigate® in benthic species despite evidence that these organisms may experience toxic doses even when the herbicide is applied at recommended application rates. This study examined the effect of exposure to Navigate® on activity levels and foraging in paedomorphic *Ambystoma talpoideum*, a benthic salamander species commonly found in the types of freshwater habitats to which Navigate® is applied. Eight salamanders were randomly placed in each of 16 outdoor mesocosms containing pond water and sediment. Navigate® was applied at the manufacturer's recommended dosage for resistant weeds to eight, stratified, randomly selected mesocosms. One salamander from each mesocosms was removed 1 day prior and 1, 14, and 42 days post-Navigate® application, placed in individual tanks, and allowed to acclimate for 24 hours prior to observation. Twenty minute behavioral observations were conducted for each salamander. At the beginning of each trial, one prey item was dropped in the tank and the number of movement events, total movement time, and successful foraging attempts were recorded. We will report statistics that compare the differences in activity levels and foraging in exposed versus unexposed *A. talpoideum*.

Characterizing RNA-Protein Complexes in *Pyrococcus furiosus*

Neil T. Pfister, CURO Scholar
Dr. Michael Terns, Department of Biochemistry & Molecular Biology, University of Georgia

Ribonucleoprotein (RNP) complexes are ubiquitous macromolecular machines involved in most major aspects of cellular function. Various protein and non-coding ribonucleic acid (ncRNA) components form distinct essential RNP complexes. The hyperthermophilic archaeon *Pyrococcus furiosus* is a model system that has provided important insight on human RNP complexes, including those implicated in diseases such as dyskeratosis congenita. We are interested in characterizing novel RNP complexes in *P. furiosus*, and through a general RNA cloning approach, have identified a new class of ncRNAs in this organism. These ncRNAs are implicated to function with a set of related proteins in viral defense in prokaryotes. In order to investigate these hypothetical RNP complexes, I have subcloned genes coding for the putative protein partners into plasmid vectors

and expressed the proteins in *Escherichia coli*. In ongoing experiments, I will screen for the ability of the proteins to interact with the ncRNAs via gel mobility shift assays. Preliminary experiments have provided evidence for interaction, supporting the hypothesized existence of these ncRNPs and providing information on their organization. The results of this work will expedite our understanding of this important class of ncRNP complexes.

Measuring Proficiency of Palm Nut (*Attalea sp.*) Cracking in Wild Bearded Capuchin Monkeys (*Cebus libidinosus*)

Tomas Pickering, CURO Summer Fellow
Dr. Dorothy Fragaszy, Department of Psychology, University of Georgia

The bearded capuchin monkeys (*Cebus libidinosus*) in Boa Vista, Brazil crack tough palm nuts using hammer stones. Cracking is an energetically costly activity. Working from an optimal foraging perspective the number of strikes is a useful proxy for the energetic costs of cracking; fewer strikes indicate greater proficiency. We analyzed the sources of individual proficiencies in cracking whole and partial nuts. The study involved direct observation of one habituated group of monkeys with twelve individuals that crack nuts. We filmed at close range the individual monkeys as they cracked nuts using a single hammer stone and anvil, and scored actions and outcomes of each cracking episode. We also obtained body weights for individual monkeys as they voluntarily stepped onto a scale. Finally we filmed one human cracking nuts using the same hammer stone and anvil as the monkeys, to provide an independent analysis of nut and anvil properties. Sufficient data were recorded on 11 monkeys for analysis purposes. Individuals required on average 7 to 76 strikes in order to crack a whole nut. Monkeys consistently placed the nuts into pits on the anvil which reduced the probability that the nut would move after it was struck and increased proficiency. Body weight was the single best predictor of proficiency, accounting for 56% of the variance. We conclude that cracking is enormously costly for smaller monkeys. That they persist in this behavior suggests that the nuts provide a high energetic return to warrant a big investment of time and effort.

The Role of Microtubules in the Formation and Degradation of Hirano Bodies

Cleveland A. Piggott, CURO Summer Fellow, CURO Apprentice
Dr. Marcus Fechheimer, Department of Cellular Biology, University of Georgia
Dr. Ruth Furukawa, Department of Cellular Biology, University of Georgia

Hirano bodies are intracellular, paracrystalline, actin-rich structures that are most commonly found in the autopsied brains of humans suffering from neurodegenerative diseases. Because they have been mostly observed in dead cells, their purpose and structure are not well understood, but their possible link to the prevention, cure, and further understanding of neurodegenerative diseases and aging has made their study worthwhile. Recently, an in vitro model to induce formation of Hirano bodies in living cells was discovered by expressing the carboxy-terminal fragment (CT) of a 34 kDa actin bundling protein mutant (Maselli et, al., 2002, 2003; Davis et, al., 2008). This model allows questions regarding the physiological effects, the formation, and degradation of Hirano bodies to be investigated. To further examine what is necessary for the formation and degradation of Hirano bodies, the role of one of the major cytoskeleton components in a cell, microtubules will be studied. Using a vector with an inducible promoter for the 34 kDa protein mutant, it was investigated what the role of microtubules were in the degradation of Hirano bodies. Dictyostelium amoeba expressing Hirano bodies were treated with nocodazole, a microtubule depolymerizing drug. After ten hours of exposure to nocodazole, it was observed that Hirano body size was abnormally large. The results of these experiments suggest that microtubules play a role in the degradation of Hirano bodies. Further experiments are required to elucidate the

microtubule-dependent degradation process of Hirano bodies.

George Washington and Abraham Lincoln: Relic Veneration and "Saint" Commemoration in Contemporary America

Stefann S. Plishka, CURO Apprentice
Dr. Asen Kirin, Department of Art History, University of Georgia

Relics of Christian saints and other holy figures were objects that came to hold a distinctive place in the repertoire of Christian rituals. Veneration of relics, including ceremonial use and pilgrimage, was integral to Byzantine Christianity and Constantinople's political environment due to the overlapping secular and religious roles of rulers, especially in Medieval and Byzantine Europe. Relic veneration was not a phenomenon unique to Byzantine Christianity, but the strong tradition of relic use and transfer within that region facilitated the evolution of this practice. However, during the Reformation and afterwards, Protestant Christianity eschewed that tradition of relic veneration as one of the excesses of Catholicism. In this paper, I intend to show links between the Catholic practice of relic veneration of saints and the parallel tradition in America of revering and commemorating past United States Presidents, particularly George Washington and Abraham Lincoln, as a component of civil religion, in which religious rhetoric is used to elevate the state. Due to secularization of culture and dominance of Protestantism in America, relic veneration does not hold the same value that it did in Catholic states. However, the same human desire for transcendence continues to drive people to derive a sense of continuity with great figures of the past. Thus, American civil religion has absorbed many ritualistic practices of commemoration which once had been an aspect of the Christianized state. Independent of geography, historical period, politics and religion, the evolution of commemorative practices helps identify motivating factors behind all rituals that provide transcendence.

The Global Arms Bazaar: Lessons from the 2006 Hezbollah-Israel War

Tyler B. Pratt, Roosevelt @ UGA
Dr. Michael Jasinski, Department of International Affairs, University of Georgia

For four weeks during the summer of 2006, the Lebanese non-state group Hezbollah shocked onlookers by employing an unexpected arsenal of technologically advanced weaponry in its conflict with Israel. The July War heralded Hezbollah's ascent to unquestioned military primacy among non-state organizations, and Hezbollah's ability to withstand Israel's powerful retaliation earned the group a striking boost in soft power throughout the Arab world. More importantly for the United States, the month-long conflict introduced a new type of foe into the calculus of the Global War on Terror: a non-state group with all the organizational prowess, public support, and military capability of a state, without the traditional limitations of deterrence or responsibility for civilian populations. While other non-state organizations have successfully exploited asymmetrical means of combating U.S. military might, Hezbollah alone has managed to procure such a diverse array of complicated, highly specialized weapons systems and utilized them to devastating effect. This paper attempts to collect and analyze available open-source information on Hezbollah's weapons procurement efforts, revealing a highly diverse supply chain that reached into every continent. It also offers suggestions for restricting the weapons, technology, and capital that found its way into Hezbollah's extensive armory from well over a dozen countries, as well as ways to improve strategic communications efforts for containing the group's growing soft power.

The Importance of American Development Aid in Nicaragua

Lucas L. Puente, Roosevelt @ UGA
Dr. Santanu Chatterjee, Department of Economics, University of Georgia

This policy paper will focus on the strategic importance of American developmental aid to Nicaragua. In recent years, U.S. aid has decreased alarmingly, despite Nicaragua's importance in maintaining American influence in Latin America. Although the recent election of leftist President Daniel Ortega worried American investors and threatened to undermine American economic clout, Ortega has shown some pro-American tendencies in the early stages of his presidency. However, he has also worked extensively with Venezuela's Hugo Chavez to strengthen political and economic ties between the two countries. With Chavez's anti-American message gaining traction throughout the region, the United States must capitalize on Ortega's pendulum-like politics to protect its Latin American economic and political interests. The United States should increase its annual developmental aid to Nicaragua in order to strengthen long-term Nicaragua-U.S. ties. Additionally, such action would stabilize the country and catalyze economic growth through increased governmental transparency, infrastructure development, and human capital advancement. This proposal will analyze relevant economic data and academic articles as well as assess the current political state of affairs to demonstrate that increased aid will yield political and economic benefits for the United States, Nicaragua, and Latin America as a whole.

Acidocalcisome-like Granules of Chicken Egg Yolk – Polyphosphate Content and Its Relationship to Development

Adam Pyrzak
Dr. Roberto Docampo, Department of Cellular Biology, Center for Tropical and Emerging Global Diseases, University of Georgia
Dr. Paul Ulrich, Department of Cellular Biology, Center for Tropical and Emerging Global Diseases, University of Georgia

Acidocalcisomes are small, acidic organelles that play important roles in a variety of cellular functions as diverse as blood clotting and osmotic balance. They contain large deposits of calcium and polyphosphate, a polymeric form of inorganic phosphate. Chicken egg yolk contains large numbers of granules that are similar to acidocalcisomes in both physiology and composition. However, the relationship between the content of these granules and development is unclear. Demonstration of an acidocalcisomal role in chicken development would help delineate the function of these organelles and further establish the basis for the wide evolutionary conservation of acidocalcisomes. Preliminary experiments demonstrated that these granules react to antibodies raised against a trypanosomatid parasite vacuolar- H^+ pyrophosphatase, an enzyme that is largely responsible for the acidic pH of acidocalcisomes. In a series of immunoprecipitation analyses with chicken yolk granules, we attempted to isolate a vacuolar-H^+ pyrophosphatase. Proteins separated by SDS-PAGE were subjected to tandem mass spectrometry for identification. Additionally, we are determining the composition of the phosphate pool in the granules. Interestingly, most of the phosphate in yolk granules is present as short-chain polyphosphate, an observation also made with trypanosomatid acidocalcisomes. We plan to more accurately quantify the phosphate components of yolk granules and ultimately hope to determine their potential role in chicken development.

Characterization of Human Stem Cells Using Quantitative RT-PCR

Sharanya Raghunath
Dr. Kelley Moremen, Department of Biochemistry & Molecular Biology, University of Georgia

Human embryonic stem cells (hESCs) are pluripotent cells derived from the inner cell mass of blastocysts and have the potential for use in cell-replacement therapies for the treatment of human disease. In order to characterize the differentiation status of several hESC lines with respect to population homogeneity or heterogeneity, several marker genes have been used to determine the extent to which the cells are pluripotent or differentiated into various germ layers. We have assembled a list of 25 genes which comprise markers for pluripotency (Oct4, Nanog, Sox2, Lefty A/B, Tert and c-myc) and markers for several differentiated lineages, including mesoendoderm (Brachyury, Wnt3a and MixL1), definitive endoderm (Sox17, Gata4, Gata6, Foxa2, Cxcr4 and Gooscoid), mesoderm (Tbx5, Tbx20, Islet1, Nkk2.5, FoxF1 and Eomes), neural ectoderm (Sox1, Nestin and Pax6), and extraembryonic endoderm (AFP). Using a previously established quantitative real time Polymerase Chain Reaction (qRT-PCR) approach, we analyzed the transcriptional profiles for the list of marker genes in five different hESC lines (BG01, BG01, BG03, H7 and H9) to determine the level of heterogeneity and differentiation of these cell populations both in the undifferentiated and chemically differentiated states. The results obtained from this study will be used to select a group of reliable marker genes for the characterization of hESC populations prior to more extensive high-throughput transcript analysis investigating changes in glycan-related genes during cell differentiation.

Functionality of Glutamate Receptors in hESC-derived Neural Progenitors vs. Matured Neurons

Anita C. Randolph
Dr. Steven Stice, Department of Animal & Dairy Science, University of Georgia

Glutamate is the most predominant excitatory neurotransmitter in the central nervous system, and therefore glutamate receptors play a prominent role in the function and development of the nervous system. Abnormalities in their expression can cause major problems in memory formation and diseases such as epilepsy, ischemic cascade and Alzheimer's diseases. We are assessing functionality of glutamate receptors in a previously established neural progenitor (NP) cell line derived from WA09 human embryonic stem cells. Characterizing this system provides a unique model for studying neural development and function in the human system. NPs have the potential to grow in a monolayer and differentiate to mature neurons that have been shown to express several subtypes of glutamate receptors. Over stimulation of certain glutamate receptors can lead to excitotoxicity. This occurs when receptors are overactivated, allowing high levels of calcium ions to enter, damage the cell, and signal apoptosis. If the receptors are functional, we should see a concentration-dependent increase in cell death due to apoptosis. This can be readily assayed using a high-throughput kit that measures cytotoxicity and viability of the cells. Once this assay is optimized for plating density, cells will be exposed to glutamate at varying concentrations and evaluated for cytotoxicity due to over-stimulation of receptors. The next step is a protection assay that will screen known inhibitors of the receptors and protect them from excitotoxicity. Successfully characterizing functional receptors on these neurons may lead to their use in screening of potential drug treatments for patients with central nervous diseases.

In Vitro Assay to Measure Cell Growth and Invasion

Claire M. Rice
Dr. Bruce LeRoy, Department of Pathology, University of Georgia

Many tests used to measure the effects of new chemotherapy drugs are first performed in live animals, as the technology has not evolved sufficiently to provide a completely suitable *in vitro* system for evaluating cancer cell growth and invasion. However, several *in vitro* assays are currently being developed for such experiments. Increasing use of laboratory tests to evaluate these processes serves the important goal of reducing the numbers of research animals used in the testing process. The purpose of this presentation is to describe several of these methodologies and how they were used to evaluate growth and invasion of a canine prostate carcinoma cell line. A canine prostate carcinoma cell line was used to study the effects of cyclooxygenase-2 (COX-2) inhibitors on the growth and invasiveness of cancer cells. Following treatment with deracoxib or carprofen, *in vitro* effects on ACE-1 cell invasion were measured using a Boyden chamber assay and an *in vitro* wound healing system, as well as growth of the cells in soft agar. Other *in vitro* methods which are being used to evaluate cancer cell growth and invasion include flow cytometric analysis of adhesion molecules, confocal microscopy, apoptosis assays, and static adhesion assays. The data from the experiments which were performed suggest that COX-2 inhibitors may be of therapeutic benefit in prostate cancer by reducing the invasion and growth of neoplastic prostate cells. The results of these experiments also show that *in vitro* methods can successfully be used to study growth and invasiveness of cancer cells.

Identity Achievement as a Function of Age, Gender, and Ethnicity

Amanda N. Rinehart
Dr. Douglas Kleiber, Department of Counseling & Human Development, University of Georgia
Dr. Pedro Portes, Center for Latino Achievement & Success in Education, University of Georgia

Identity formation is one of the most challenging developmental issues adolescents and young adults face. It has been generally presumed that identity formation progresses in the same way for all individuals, but previous research has been done primarily with white, Anglo-Saxon males. Adolescents and young adults construct their meanings of self in social contexts, so this study was conducted to explore whether identity achievement differs by gender and ethnicity. . New research is necessary to gain a comprehensive understanding of identity formation as a critical developmental process that is affected by life circumstances. Furthermore, it is important to continue to evaluate the effectiveness of the instruments used to assess such a complex construct. Several instruments have been used to assess identity formation in the past but have led to different findings. In this study, a convenience sample of 326 males and females from different ethnic groups between the ages of 11 and 36 were given two identity development measures: the Ego Identity Process Questionnaire (EIPQ), and the Identity Status Interview (ISI). Findings will be reported according to age, gender, ethnicity, and their interaction. Consistency or inconsistency in the results as a function of the measure used will determine the validity of the group differences identified as well as reflecting on the validity of the measures. Differences among age groups are to be expected; differences in gender and ethnicity are yet to be established.

Avoiding Overcorrection: Solving the Army's Readiness Crisis

Robert Rosenbleeth & Rocky T. Cole, Roosevelt @ UGA
Dr. Patricia Sullivan, Department of International Affairs, University of Georgia

To many in the U.S. military, Operation Iraqi Freedom shows that the Army lacks enough personnel to fight the "long war" against Islamic extremism. In response to this concern, the Department of Defense is pushing for a permanent 65,000 soldier increase of the Army's end strength, the legislated number of active-duty personnel that the Army must employ. However, this increase constitutes a dangerous overcorrection for the Army's shortcomings in counterinsurgency operations—protracted, low-intensity conflicts against radical guerillas. Significant "boots on the ground" will not effectively quell asymmetric insurgencies. The Defense Department's plan will only burden the military with massive expenses. These funds would be better spent on training and technology—force multipliers essential to future military successes. The Army should maintain its end strength around the current level and focus on building a highly trained and smartly equipped force. Investing in advanced communication technology, robotics, and extensive training—specifically academic training in military strategy, sociology, and linguistics—will transform the Army into a versatile expeditionary force. Because of its higher per unit lethality and specialization in counterinsurgency and counterterrorism operations, creating such a force will negate the need for more "boots on the ground" and increase the Army's success in future conflicts. To compensate for the loss of traditional infantry capabilities, Congress should expand the National Guard to create a force of "citizen soldiers" that can be quickly deployed if the strategic environment justified a large infantry operation. To support our argument, we present a review of recent military and scholarly analysis of the strategic lessons being learned in Iraq.

Understanding M16A Metalloprotease Enzymology

Jarrad W. Rowse, CURO Scholar
Dr. Walter Schmidt, Department of Biochemistry & Molecular Biology, University of Georgia

The human insulin-degrading enzyme (IDE) has the ability to degrade the Aβ peptide. Because accumulation of Aβ in the brain is believed to be a causative agent of the neurodegenerative Alzheimer's disease (AD), IDE has become a potential drug target for the prevention and treatment of AD. IDE has significant sequence homology to metalloproteases in a wide range of other species, including the yeast metalloprotease Ste23p that functions in **a**-factor mating pheromone production. These homologous proteases are collectively classified as M16A metalloproteases. Yeast are used as a model system to evaluate the hypothesis that M16A enzymes have similar substrate-specificities. This system is used to compare the activities of various mutant M16A metalloproteases in an effort to understand the functional impact of charge switch mutations on M16A metalloprotease. This model system has also been used to determine the essential elements of the *STE23* promoter. By evaluating yeast mating ability and using immunoblotting techniques to assess expression levels, it has been determined that neither the predicted initiator methionine residue of Ste23p nor the upstream promoter region (nearly 400 residues) is required for the production of functional Ste23p but is integral in transcriptional initiation. These results are providing insight into the physiological relevance of Ste23p and other M16A metalloproteases by offering an understanding of their transcriptional initiation mechanism and the relationship between structure and function. Ultimately, these studies could lead to the development of a hyperactive enzyme with therapeutic advantages as a treatment for the accumulation of amyloidogenic plaques.

The Impact of Chinese Product Fraud and Lack of Quality Control on U.S. Commercial Trade Laws and Regulations

Meghan A. Royal
Prof. Marisa Pagnattaro, Department of Legal Studies, University of Georgia

Commercial markets across the globe are beginning to rely more heavily on exported goods and services from one of the world's strongest industrial powers, the People's Republic of China. Although these advances in international trade promote cooperation between nations, conflicts in quality regulations and product fraud have presented numerous problems for many American companies who engage in business with Chinese manufacturing corporations. Commercial laws define and shape our nation's business interactions with foreign manufacturers, as well as safeguard our country's economy and protect American consumer's interests. The purpose of this paper is to discuss possible solutions to a number of these issues as well as possible modes of conduct that will hopefully produce a successful global trade economy and culture. This paper investigates many areas of international trade, focusing specifically on our relationships with China. Part II reviews various guidelines and agreements that govern the realm of global commerce, taking a special look at U.S. domestic policies that affect trans-national trade. Part III analyzes World Trade Organization policies as well as a few of the organization's recent dispute hearings between the two nations. Part IV discusses recent cases of product fraud and the quality controls that are implemented and enforced by both the U.S. and Chinese governments. Part V analyzes both U.S. and Chinese legislation recently put into practice to correct the damages made, as well as proposes possible solutions that could be adopted by American businesses and organizations to further protect U.S. consumers from harmful imports.

Project Runway: Untitled

Lindsay MacLean Ruderman, Susan Kent & Rachel Huggins
Prof. Clay McLaurin, Department of Fabric Design, University of Georgia
Prof. Mary Pearse, Department of Jewelry/Metalsmithing, University of Georgia

In this collaborative project and runway exhibition by Jewelry/Metalsmithing students of Professor Mary Pearse and Fibers students of Professor Clay McLaurin, material, adornment and body as site are examined and performed, taking cues from Visiting Artist Anya Kivarkis, and the publication "Fashion at the Edge." For one week, these students worked in teams of five with non-traditional materials, manipulating paper towels, hosiery, window screening and roofing shingles into performative, and in some cases spectacular, wearable art.

We chose to address the idea of consumption in society and explore the opposition of

manufactured consumer products and the natural human body. Transforming consumable paper products into a beautiful piece that takes over the body speaks to the trend of over-consumption that is so prevalent in our society.

Materials: Nylons, batting

A Feasible Trilateral Agreement: A Convergence of Interests

Aaron M. Sayama, Roosevelt @ UGA
Dr. Seema Gahlaut, Center for International Trade & Security, University of Georgia

India and Japan have become increasingly important in the Asian theater over the past decade. Their economic growth during this period has been accompanied by significant changes in their security perspectives: they are keen to play an active role in spreading democracy and partnering with the United States to help maintain the economic and security architecture of Asia. As U.S. policymakers grapple with the challenge represented by the rapid growth of China and its impact on Asian security and economy, India and Japan are getting a closer look as long-term U.S. partners. Accordingly, creating a trilateral cooperation through informal and formal agreements between the United States, India, and Japan would further the best interests of all three nations. In fact, these three powerful states have already begun the process of coordinating policies in order to shape regional dynamics in Asia to best suit their converging interests. This paper will address the economic and political areas that can most immediately serve to cement a Japan-India-U.S. trilateral agreement. Four areas of cooperation are identified: new security architecture in Asia, increased economic interdependence, collaboration in nuclear energy, and efforts to establish and spread democracy. In each area, I will discuss what is already taking place and how to encourage this burgeoning alliance. The paper will also address how to tackle thorny diplomatic issues, such as preventing a counter-alliance from developing among other Asian nations.

Relationships Between Psychosis Risk Scales and Antisaccade Performance

Julia R. Schuchard
Dr. Jennifer McDowell, Department of Psychology, University of Georgia

The relationships between psychosis risk scales and antisaccade performance may further the understanding of the development of symptoms often seen in people with schizophrenia, including hallucinations and delusions as well as flat affect. Research suggests that non-clinical individuals who have minor manifestations of those symptoms, such as perceptual abnormalities and anhedonia, are at greater risk of developing psychosis. Furthermore, people with schizophrenia and people at risk for schizophrenia by virtue of biological relatedness to someone with the disorder make more errors of inhibition as assessed by antisaccade tasks. Antisaccade tasks require rapid eye movements to the mirror image location of a peripheral stimulus (same amplitude, opposite side). Considering the demonstrated relationships between schizophrenia and antisaccade performance, we hypothesized that a positive relationship will exist between antisaccade errors and scores on scales assessing odd and unusual experiences that are associated with risk for developing psychosis. In the present study, normal undergraduate participants responded to 179 items of the Chapman Psychosis Scale, using the following subscales: Perceptual Aberration, Magical Ideation, Physical Anhedonia, and Revised Social Anhedonia. Participants also performed antisaccade tasks, which were scored in terms of the numbers of errors and the required processing time (latencies) and accuracy (eye amplitude/target amplitude) for correct responses. We compared antisaccade performance between extreme groups on the psychosis risk scales. We also correlated antisaccade error rates with individual subscale scores. If significant relationships between psychosis risk scales and antisaccade performance are found, they may help identify individuals at greater risk of developing psychosis.

Effects of Initial Population Size and Food Quality on Stochastic Population Persistence

Jeff Shapiro
Dr. John Drake, Eugene Odum School of Ecology, University of Georgia

Extinction is a fundamental problem for ecological theory, yet theory currently far outstrips the experimental support needed to empirically distinguish alternative models. For example, theory predicts that small initial population size has a negative effect on stochastic population survival. Few empirical studies have tested this theory and conflicting results have been produced. We examined the influence of initial population size, habitat size, and food quality on persistence times and population growth of laboratory *Daphnia magna* populations. We hypothesized that (1) lower initial population sizes would be more vulnerable to stochastic factors and should therefore have shorter persistence times, and (2) both larger habitats and more nutritious food sources would increase carrying capacity, thus should support increasing population persistence. 60 experimental habitats (30 1400mL and 30 700mL tanks) were inoculated with 1, 2, 3, 4, or 5 *D. magna*. 30 tanks were fed a live green alga from the genus *Selenastrum* (nutritious treatment) while the rest were fed a suspension of pulverized blue-green alga *Spirulina* (less nutritious). After 5 weeks, uncontrolled growth of *Selenastrum* in tanks confounded the data, thus producing results contrary to predictions of a standard model. We then eliminated the food quality variable by feeding *Spirulina* to all populations and started a new trial. Data as of 1/7/2008 indicates a probable effect of initial population size ($p = 0.089$) and habitat size ($p = 0.024$) on persistence times. By the experiment's end, our study will confirm the validity of current extinction models and give direction to wildlife managers.

Functional Characterization of a Putative Inositol-1,4,5-Trisphosphate Receptor in the Parasite *Trypanosoma brucei*

Edgar A. Shartilov
Dr. Silvia Moreno, Department of Cellular Biology, Center for Tropical and Emerging Global Diseases, University of Georgia
Dr. Paul Ulrich, Department of Cellular Biology, Center for Tropical and Emerging Global Diseases, University of Georgia

Trypanosoma brucei brucei is the causative agent of nagana in Africa and is closely related to *T. b. rhodesiense* and *T. b. gambiense*, which cause sleeping sickness or African trypanosomiasis. Calcium signaling pathways in trypanosomatid parasites have large influences on cell differentiation and invasion but are largely undescribed. In a proteomic analysis of subcellular fractions, we identified a putative inositol-1,4,5-trisphosphate receptor in *T. brucei* (TbIP3R) and we are determining its function by blocking its expression. Double-stranded RNA interference (RNAi) in *T. brucei* inhibits gene expression and degrades RNA molecules by targeting transcripts of specific genes. We cloned the C-terminal (Ct) and N-terminal (Nt) region of TbIP3R to generate RNAi constructs. We ligated the constructs into the RNAi vector p2t7tiB and transfected procyclic stages of the 29-13 strain of *T. brucei*. We analyzed the effects of TbIP3R knockdown on cell growth of transfected cells. Using this RNAi cell line, we plan to determine the effects of TbIP3R knockdown on parasite virulence, calcium signaling, and responses to environmental stress.

Characterization of *Mycobacterium shottsii*

Purvi S. Sheth, CURO Summer Fellow, CURO Scholar
Dr. Russell Karls, Department of Infectious Diseases, University of Georgia

Mycobacterium shottsii is a slow-growing bacterium that was isolated from lesions in striped bass in the Chesapeake Bay within the past decade. It remains unclear whether this bacterium is an etiological agent of disease. Therefore, our goals are to develop molecular

biological methods and infection model systems to more closely study this new species. One emphasis of the project was to examine antibiotic resistance in *M. shottsii*. The minimum inhibitory concentrations of the drugs kanamycin and hygromycin were determined. Another goal of the project was to determine if *M. shottsii* has a mycobacteriophage L5 attachment site on its chromosome. Such a site is present on several other mycobacterium species. The presence of the site is useful to researchers as it provides a location where genes of interested can be introduced and expressed in single copy. To test this hypothesis, *M. shottsii* bacteria are transformed with a suicide plasmid (encoding the mycobacteriophage L5 integrase and attachment site and an antibiotic resistance gene) and spread onto plates containing selective medium. The results of this study are pending as this is an extremely slow-growing bacterium on agar media. If colonies appear on the plates, they will be screened by PCR for DNA specific to the suicide plasmid. If the appropriate-sized product is detected, then it will support the hypothesis that this species contains the mycobacteriophage L5 chromosome integration site. Since *M. shottsii* was isolated from an aquatic source, we examined whether the bacterium survives within amoebae, as has been reported for other mycobacterium species. To investigate this question, *M. shottsii* previously-transformed to express green fluorescent protein (GFP) was mixed with amoebae and examined over time. In our initial studies, bacteria expressing GFP were detected inside of the amoebae after a few days of incubation suggesting that this species can survive inside of amoebae. Whether it can persist for much longer periods of time is under investigation.

The Naturally Attenuated TCC Strain of *Trypanosoma cruzi* Induces a Specific CD8+ T Central Memory Response

Laura J. Simpson
Dr. Rick Tarleton, Department of Cellular Biology, University of Georgia

Trypanosoma cruzi is the causative agent of Chagas disease, a major health concern in Latin America today. Experimental vaccination in animal models has shown that TCC, a naturally attenuated strain of the parasite, provides protection against a virulent infection. This research project aims to characterize the immune response against the TCC strain mediated by T lymphocytes expressing the surface marker CD8. Inoculation of TCC parasites induced specific $CD8^+$ T lymphocytes that were detected using major histocompatibility complex class I tetramers containing the immunodominant *T. cruzi* trans-sialidase peptide, TSKB20. Expression of the surface molecules CD62L and CD127 on $CD8^+$ T lymphocytes suggests that the majority of these cells are central memory cells, a group of long-lasting memory cells considered to be important in vaccine-induced protection. As TCC parasites are not directly detected in the blood of infected mice, hemoculture and Real Time PCR of tissues from immunosuppressed mice were used to demonstrate parasite persistence. These results suggest that TCC parasites persist in low numbers and induce a central memory response. A predominance of central memory $CD8^+$ cells has not been previously described in a model of persistent *T. cruzi* infection. Future experiments will help characterize the kinetics of the $CD8^+$ response and the protection capacity provided by either oral vaccination with TCC or after TCC parasite clearance by drug treatment. This research provides insight into the immunological basis of protection induced by TCC parasites, and will help build a framework for testing experimental vaccines of genetically engineered parasites.

"In the Shadows of Espionage": Extraordinary Rendition as a Threat to American National Security

Rachel A. Spencer & Sarah Vaughn, Roosevelt @ UGA
Dr. Loch Johnson, Department of International Affairs, University of Georgia

Since the Clinton administration, the U.S. has challenged internationally accepted standards and laws by using extraordinary rendition. This process, conducted in the "shadows of

espionage" involves the abduction of suspects on domestic and foreign soil intending to transport them to 'black sites.' Here, the Central Intelligence Agency (D/CIA) often charges agents of other nations to employ a range of harsh interrogation methods, while also precluding the U.S. from claiming a 'moral high ground,' and much needed legitimacy in the ongoing war on terror. We therefore propose the U.S. reject the use of rendition in favor of legal and moral approaches to intelligence. Specifically, we recommend Congress pass legislation calling for the utilization of judicial processes in the accused native's country or formal extradition, thereby providing such investigations with oversight. The U.S. should properly enforce the Alien Tort Claims Act and ratify the U.N. Convention Against Torture to earn the trust of the global community and uphold the ideals of democratic institutions. The goal of our research is to demonstrate that renditions not only severely harm America's reputation abroad but, paradoxically, undermine our national security by causing other nations to openly debate that the U.S. actually lack the ideal it claims to maintain. To achieve this, we will present legal and normative examinations of international conventions, foreign treaties, speeches, academic literature, print media, and the Constitution. Although the implementation of this proposal would face obvious challenges, the benefits to American national security and reputation would far outweigh them.

The Distribution of Rabies Antigen by Immunohistochemistry in the Brains of Different Mammalian Species

Lindsay T. Stein
Dr. Corrie Brown, Department of Pathology, University of Georgia

Rabies is a fatal zoonotic viral infection of the central nervous system, affecting different parts of the brain in different species. It is transmitted by the bite of a rabid animal and is capable of infecting all mammalian species. In the United States in 2006, there were 6,940 reported cases of rabies in animals and 3 cases in humans. Approximately 92% of the cases were in wildlife, and 8% were in domestic animals. Rabies is usually diagnosed by the detection of a viral antigen in the brain by using a direct fluorescent antibody test (FAT), or by the presence of intracytoplasmic eosinophilic inclusion bodies (Negri bodies) of the neurons associated with nonsuppurative meningoencephalitis in routine histological preparations. However, neither of these techniques are satisfactory as FAT requires manipulating samples that have an active virus, and detection of Negri bodies is possible in only 50-80% of cases. Another technique that has recently been applied is immunohistochemistry, which is as sensitive as FAT, but is performed on fixed samples, so there is no operator exposure. The objective of our study is to use IHC to better characterize the distribution of the antigen in different segments of the brain in several species naturally infected by rabies, including horse, cow, sheep, goat, dog, cat, raccoon and skunk. This will improve diagnosis of the disease by establishing the better location for selection of fragments for FAT, and histopathologic changes, including Negri bodies.

Diversity and State-Building: A Cross-Country Analysis of the U.S. and Canada

Karen E. Tanenbaum
Dr. Christopher Allen, Department of International Affairs, University of Georgia

The United States and Canada, beacons of democracy and diversity in the Western world, have taken dramatically different approaches to ethnic and racial diversity in their democracy-building. Canadian state institutions generally are more socially and politically inclusive of minority groups, while those of the U.S. generally are less inclusive and more particularistic. Correspondingly, minorities in the U.S. continue to experience disproportionately greater poverty and challenges in access to education and health care than their Canadian counterparts. This essay attempts to explain these divergent outcomes in the state's accommodation of internal diversity. More specifically, it strives to uncover the factors that enabled and encouraged Canadian

(and discouraged American) state involvement in the accommodation of minority groups through the public sector. I isolate three factors—one social, one institutional and one political—that arguably influence this outcome: 1) the level of social or generalized trust among citizens, 2) the path-dependency or tendency towards the status quo of political institutions (beginning with their formations in response to revolutionary change), and 3) the size and bargaining power of their respective minority groups. Each of these variables partially explains a state's level of involvement in the accommodation of minorities. However I hypothesize that the third explanation, the size and bargaining power of a given minority group, carries the most weight in influencing relevant policy outcomes. This comparative study strives to illuminate the dominant forces behind minority policies in the U.S. and Canada and to encourage a critical re-examination of the relationship between diversity and democracy.

Mixed Income Housing: A Comprehensive Reconstruction Plan for New Orleans

Lila E. Tedesco, Roosevelt @ UGA
Dr. Andrew Carswell, Department of Housing & Consumer Economics, University of Georgia

Even prior to Hurricane Katrina, poverty has plagued New Orleans. Katrina has created the unique situation in which nearly all of the parishes must be rebuilt, granting an opportunity to address this historic problem. This paper explores the benefits of mixed-income housing as an effective development strategy to expand the social mobility of the lower classes and proposes an optimal method toward comprehensive neighborhood development, using the city of New Orleans as a case study. Mixed income housing deconcentrates poverty and integrates classes to create a stimulating environment that leads to community improvement on the whole and opens opportunities for individual residents. I measure the effectiveness of this implementation using Thomas Boston's Quality of Life Index, which consists of both family and neighborhood indexes and which has been used to show the effectiveness of other mixed-income projects in Atlanta and Chicago. Follow-up programs such as job placement, housing counseling, and access to public services ensure the benefits of mixed-income housing. Using theories of "New Urbanism" enhances the community aesthetics, making the community appealing to all income levels. Funding for this effort would come from a variety of established federal initiatives such as housing trust funds and low-income housing tax credits. Incorporating these developments into the Unified New Orleans Plan coordinates reconstruction to prevent isolated developments. A cohesive and economically integrated rebuilt New Orleans promises a future free of the social ills that the city has battled in the past.

Project Runway: Screen Study

Marie Tetzlaff, Allison Sheats & Kathleen Janvier
Prof. Clay McLaurin, Department of Fabric Design, University of Georgia
Prof. Mary Pearse, Department of Jewelry/Metalsmithing, University of Georgia

In this collaborative project and runway exhibition by Jewelry/Metalsmithing students of Professor Mary Pearse and Fibers students of Professor Clay McLaurin, material, adornment and body as site are examined and performed, taking cues from Visiting Artist Anya Kivarkis, and the publication "Fashion at the Edge." For one week, these students worked in teams of five with non-traditional materials, manipulating paper towels, hosiery, window screening and roofing shingles into performative, and in some cases spectacular, wearable art.

This piece stems from a purely formal materials study, which seeks to upset traditional knowledge of fiberglass mesh as a flat, transparent substance by forming it into volumetric shapes that overlap to create an opaque garment. As each modular unit builds on the next, the bulging screen begins to blur the figure of the model beneath while obscuring any reference to more conventional dress shapes on the exterior. Both the material and its

unorthodox handling help make this piece less of a dress itself and more about the idea of a dress.

Materials: Mesh Fiberglass

Perceptions of Puerto Rican Women and Their Impact on Public Health Policy in the Early 20th Century

Adam Thomas
Dr. Reinaldo Román, Department of History, University of Georgia

This presentation will reveal the negative impact that U.S. government depiction of Puerto Rican women had on policy, both in the United States and on the island of Puerto Rico. This will be done through an analysis of the portrayal of these individuals in government literature. I will begin with a brief discussion of the history of public health in the United States, then continue into a short analysis of the reasons for U.S. occupation of the island. Next, I will proceed into a depiction of areas of control that the government exerted during the period—the health of American service men, the economics of Puerto Rico, and the political realities of Puerto Rican women. The health of U.S. service men received extensive attention, often expressed in terms of sexuality, with these men encouraged to avoid sexual contact with "dirty women," and when necessary, utilize some form of prophylactics, which were still taboo among mainstream society. The presence of prostitution on the island furthered the negative portrayal of women and in turn fed the government's ability to deny them political rights, as they were "subverting the social norms" of the island. It also provided one means with which the United States was able to deny Puerto Rico political independence. I will conclude by discussing the impact these policies have had on contemporary Puerto Rico and analyze what, if any, changes can be made to alleviate them.

Comparison of the Acute Toxicity of Selective Serotonin Reuptake Inhibitors (SSRIs) and St. John's Wort (*Hypericum perforatum*) to *Ceriodaphnia dubia*

Yen Tran
Dr. Marsha Black, Department of Environmental & Health Sciences, University of Georgia

The Clean Water Act prohibits the discharge of materials in toxic amounts to the waterways of the nation. St. John's Wort *(Hypericum perforatum)* has been widely used as an herbal anti-depressant drug. Recommended dosage is three 352 mg capsules daily. When St. John's Wort is excreted from the urinary system of consumers, it maintains some of its active ingredients, hypericin and hyperforin. If the active substances are not removed or degraded by wastewater treatment and occur at sufficiently high concentrations, they may have toxicity to aquatic life. In the present study, acute toxicity tests were used to determine the potential toxic activity of St. John's Wort in a model aquatic organism. *Ceriodaphnia dubia* were exposed to various dilutions of St. John's Wort, and LC50s were calculated to determine the mortality rate. Average LC50s for St. John's Wort at 24 and 48 hours were 50.8 and 34.3 mg/L, respectively. Thus, aquatic organisms may risk toxicity if they are continuously exposed to St. John's Wort. Compared with the prescription antidepressants (SSRIs), St. John's Wort is 10-244 times less toxic. At high consumption and excretion, St. John's Wort could cause similar risks of toxicity to aquatic organisms as SSRIs. Further chronic toxicity tests and aquatic analyses are needed to determine concentrations of St. John's Wort that may harm aquatic environments.

IS492 Movement on the *Pseudoalteromonas atlantica* Chromosome

Steven P. Trau
Dr. Anna Karls, Department of Microbiology, University of Georgia

Pseudoalteromonas atlantica is a primary biofilm-forming marine bacterium. Biofilm formation requires production of extracellular

polysaccharide (EPS). In *P. atlantica,* EPS production (+/-) and the associated colony morphology [mucoid (+) or crenated (-)] is controlled by movement of a mobile element, IS*492*. Excision of IS*492* from *epsG* allows for the production of EPS and yields a mucoid phenotype while insertion of IS*492* into *epsG* yields a crenated phenotype. *P. atlantica* contains five copies of IS*492* in its genome including the *epsG*-associated copy. The precise excision of the *epsG* copy of *IS492* occurs at a fairly high frequency (10^{-3}/cell/generation) and leaves the chromosome with four copies of IS*492.* Current research suggests that low frequency insertion of IS*492* into *epsG* (10^{-6}/cell/generation) occurs by replicative transposition of another chromosomal copy thus leaving a copy at the donor site while inserting a copy into *epsG*. To investigate the movement patterns of the chromosomal copies of IS*492* Southern blot analyses are performed with chromosomal DNA from mucoid and crenated isolates which come from multiple, vertical generations of a specific *P. atlantica* strain. The probe used for detection of IS*492* in the Southern blots is a PCR product corresponding to the first 744 base pairs of IS*492* which is labeled with digoxigenin (DIG) and detected by binding of anti-DIG antibody that is linked to chemiluminescence or colorimetric enzymes. This Southern analysis will test whether precise excision of IS*492* is linked to insertion at any site on the *P. atlantica* chromosome.

African-American Models of Success

Darryl Tricksey, CURO Apprentice & Dakia McCray, CURO Apprentices
Dr. Victoria Plaut, Department of Psychology, University of Georgia
Dr. Larry Nackerud, School of Social Work, University of Georgia

What predicts success for African-American students at a majority White institution? Past research has shown that trust of a majority group, stereotype threat, racial identity, and educational beliefs predict academic excellence among African-Americans. Absent from these investigations, we argue, is consideration of pervasive African-American models of success, that is, personal definitions and connotations about success and its attainability. The present study will be the first to examine African-American models of success, taking into account both the various factors that have predicted achievement and their interaction. We are currently working with focus groups to design a survey funded by a RED seed grant that will be used to measure aspects of models of success within a diverse, randomly selected pool of African-American students. The focus groups will allow us to include any overlooked variables, reaffirm the inclusion of existing variables, and establish new links among existing variables. We believe our research will show that models of success can act as predictors of both performance outcomes and aspirations. We also hope to gain further insight into connections between racial identity, trust and security, educational beliefs, and other variables as they relate to models of success. Ultimately, we hope to generalize the construct of African-American models of success in majority White institutions and publish our work in order to encourage the adoption of best practices.

Antonio Vivaldi's Contribution to the Evolution of Program Music

Robert M. Truan
Dr. Susan Thomas, Department of Musicology & Ethnomusicology and Institute for Women's Studies, University of Georgia

A composition in which a composer attempts to aurally depict a predetermined narrative is known as program music. Antonio Vivaldi's (1678 – 1741) *The Four Seasons* (1725) is a series of four violin concertos representing the yearly seasons through music composition by accompanying each score with a seasonal sonnet. Even though program music is regarded as a nineteenth century phenomenon, *The Four Seasons* can be seen as an early contributor to the practice. In this paper, I demonstrate three ways in which The Four Seasons can be seen as proto-programmatic music. Through analysis of the music score, I show how Vivaldi's

composition uses musical sound to express non-musical elements. I also suggest how historical precedents to program music influenced Vivaldi's composition, particularly the process of vocal madrigalisms' application to instrumental music. Madrigalisms refer to a compositional technique of their genre, Italian madrigals, in the sixteenth century. Finally, the literary basis for the provided sonnets in *The Four Seasons* will reveal the external program that Vivaldi attempts to depict. Compositional techniques that Vivaldi used were innovative not only for their time but also shed light on the development of program music.

A Cross-Cultural Comparison of Gender and Role-Identities in China and the United States

Traci N. Tucker, CURO Summer Fellow, CURO Scholar
Dr. Dawn Robinson, Department of Sociology, University of Georgia

This study seeks to understand how cultural evaluations of an occupation influence the way in which we gender that occupation. According to Affect Control Theory, individuals seek to maintain their definitions of the situation (their expectations for a particular event). Thus, this study investigated the prediction that the more similar the cultural meanings attached to a particular occupational identity are to the cultural meanings attached to a gender identity (e.g., Man, Woman), the more gendered will be our expectations of that occupational identity. Gender and occupational meanings from the U.S. and China, measured in Evaluation, Potency, and Activity, were used to create a measure of distance between gender meanings and the meanings attached to a list of various occupational identities. A cross-national survey was then conducted in which 42 undergraduate students from a large university in the United States and 46 undergraduate students from a large university in southeast China provided ratings about whether the most appropriate occupant of each identity would be a man, a woman, or either. These ratings were compared against predictions generated from Affect Control Theory based calculations of meaning-distance. Logistic regressions examined whether these meaning-distances predicted assessments of gender appropriateness for occupational identities. Results suggest that gender appropriateness is defined primarily by the relation of the occupational identity to the role of woman. The occupational identities' relation to the role of man appears to be less salient in the gendering process.

RGS Regulation of the LPA Signaling Pathway in Prostate Cancer Cells

Kathryn L. Turner
Dr. Shelley Hooks, Department of Pharmaceutical & Biomedical Sciences, University of Georgia

Lysophosphatidic acid (LPA) is a signaling molecule that induces proliferation, migration, metastasis, and survival in prostate cancer cells by activating cell surface G-protein coupled receptors (GPCRs), which in turn activate G-proteins. Regulators of G-Protein Signaling (RGS) proteins deactivate G-proteins, thereby stopping the signal. In cancer cells these G-proteins are active, leading to increases in the signal and cancerous activity. RGS proteins are likely therapeutic targets, because there are many different forms that bind specifically to different G-proteins, therefore ones utilized in prostate cancer can be identified. Our hypothesis is that RGS proteins are present in the cells and regulate G-proteins involved in LPA signaling in prostate cancer cells. The effects of LPA were determined by testing the amounts of different second messengers, specifically cyclic adenosine monophosphate (cAMP) and inositol phosphate (IP), which vary depending on the level of LPA activation. The results reveal that prostate cancer cells are affected by LPA, with increases in LPA leading to changes in second messenger production, suggesting that the LPA pathway is present in prostate cancer cells. By studying the differences between RGS sensitive and insensitive G-proteins, we can determine the effect of RGS proteins on this pathway. If it is found that RGS proteins regulate this LPA signaling pathway and are present in the cell, then further research can be done to identify

which RGS proteins are involved in prostate cancer and which could be used as therapeutic targets.

An Investigation of the Relationship between the Existence of Inc A/C Plasmids and the Prevalence of Multiple Therapeutic Antibiotic Resistances

Matthew A. Turner
Dr. Susan Sanchez, Department of Pathology, University of Georgia

The possible correlation between high use of therapeutic antibiotics in food animals and increased antimicrobial resistance in bacteria has drawn increased public attention. Recent work indicates that Inc A/C plasmids, such as pSN254, may be a source of the correlation, serving to pass multiple antimicrobial resistances, including streptomycin, tetracycline, and several others, by plasmid conjugation between normal flora of the G.I. tract and Salmonella serotypes passing through animals. This study was designed to determine the abundance of Inc A/C plasmids in bacterial isolates from cattle and the potential relationship between these plasmids and the presence of multiple drug resistances. The repA gene was used as an indicator of the presence of Inc A/C plasmids and was identified through the use of PCR analysis and gel electrophoresis. Both Salmonella and normal flora isolates from farms in Northeast Georgia and Salmonella isolated from clinically sick cattle around the state of Georgia were tested. 100% of Salmonella isolates from healthy farm cattle tested positive for the repA gene, while clinical isolates rarely tested positive other than in Salmonella Newport serotypes. In order to determine if there is a correlation between these plasmids and resistances, we examined phenotypic resistances of repA positive, normal flora isolates from the same farm. Results indicate that 79.3% of repA positive samples demonstrated strA resistance, 86.2% demonstrated strB resistance, and 86.2% demonstrated tetA resistance. The isolates demonstrated several other resistances as well, but those demonstrated lower levels of correlation with the repA gene. These results indicate strong possibilities of a correlation between Inc A/C plasmids and these resistances, that the normal flora may frequently carry these Inc A/C plasmids, and that Salmonella Newport strains may be more likely than other strains to carry these plasmids.

SPQ-Identified Schizotypy and Antisaccade Performance in a Normal Population

Manouela V. Valtcheva
Dr. Jennifer McDowell, Department of Psychology, University of Georgia

People with schizophrenia have problems inhibiting inappropriate behavior. One simple measure of inhibition is via antisaccade tasks during which subjects are instructed to inhibit a glance to a target and generate a glance to the mirror image location. Errors towards the target are reported more frequently in people who are related to someone with the illness (and therefore at greater risk for developing the illness themselves). People who have schizotypal personality characteristics (unusual experiences such as illusions, magical thinking or suspiciousness) often display behavioral and psychophysiological measures similar to those in people with schizophrenia. The purpose of this study is to investigate whether there is a relationship between increased antisaccade errors and questionnaire-identified schizotypal traits in subjects who do not have a family history of schizophrenia. Participants from the undergraduate research pool were screened for psychiatric history before they participated. Participants also completed a self-report Schizotypal Personality Questionnaire (SPQ) and were measured on antisaccade performance. Group comparisons of participants at the low and high extremes of the distribution of antisaccade error rate were conducted to investigate the association between SPQ scores and antisaccade performance. It is hypothesized that a positive relationship will exist between schizotypal symptoms and error rates. Such results would demonstrate the presence of critical psychophysiological characteristics in a normal undergraduate population. Furthermore, the possibility of studying schizophrenia-risk in

normal subjects who have distinct patterns of scores on these measures would greatly enhance our ability to research related issues in an unimpaired group.

Does Writing Ability Predict Academic Achievement? Evidence from the New SAT Writing (SATW) Section
Jessica N. Van Parys, CURO Summer Fellow
Prof. David Mustard, Department of Economics, University of Georgia

In 2005, the College Board substantively altered the format and content of its SAT Test by adding a writing section (SATW) to the existing verbal (SATV) and math (SATM) portions. No research exists on the extent to which the SATW relates to student performance in college. Thus, admissions offices of many higher educational institutions have disregarded the SATW scores in their admission decisions. By examining how the SATW affects a number of college performance outcomes, this study fills the gap in the academic literature and also provides evidence for formulating admissions policies. This study uses data for over 4,300 first-year students at the University of Georgia who were in the first cohort of students to take the SATW and complete a year of higher education. These student-level data provide information about personal (e.g., race, gender, parental education) and high school characteristics (GPA, SATM and SATV scores, Advanced Placement courses, high school attended). The data also include every college class students took and their corresponding grades. Regressions that control for personal and high school characteristics indicate that with each 100-point increase in SATW scores, students earn, on average, 0.07-points higher first-year GPAs and 0.18-points higher GPAs in freshman English courses; they also enroll in and earn 0.44 and 0.54 more credit hours, respectively. Conversely, these students withdraw from 0.2 fewer credit hours and are 3% less likely to lose the HOPE Scholarship. In general, SATW scores better explain student performance than either the SATV or SATM scores.

Sequencing and Tissue Distribution of Toll-like Receptor 3 in White-tailed Deer
Seychelle M. Vos, CURO Scholar
Dr. Elizabeth Howerth, Department of Pathology, University of Georgia

Hemorrhagic disease is a fatal disease in white-tailed deer (WTD) caused by two closely related orbiviruses, bluetongue virus and epizootic hemorrhagic disease virus. Susceptibility to these viruses varies among populations of WTD, and results from experimental studies suggest that innate immunity may contribute to these differences. It is hypothesized that the Toll-like receptor 3 (TLR3), an important intracellular receptor in innate immunity that recognizes double stranded RNA (dsRNA), may be involved in differences in innate immunity in WTD populations. However, little is known about TLRs in WTD, and rudimentary information is needed before the potential effect of TLR3 on disease susceptibility can be evaluated. Therefore, the objectives of this study were to sequence and determine tissue distribution of the mRNA of TLR3 in normal WTD. A 209bp portion of WTD TLR3 mRNA was sequenced using primers designed originally for TLR3 mRNA in cattle. Primers were then designed specifically for deer using the newly sequenced fragment. Quantitative analysis of TLR3 mRNA in various WTD tissues from non-infected WTD is being performed using real time-polymerase chain reaction (qRT-PCR). Preliminary results suggest that the TLR3 is expressed in skin, small intestine, brain, lung, and spleen at levels that may prove useful in future research. These results will allow further investigation into the overall significance of the TLR3 in variation of susceptibility to disease among WTD populations.

Source Memory and Picture Location in Relation to Working Memory
Dana Wagshal, CURO Scholar
Dr. Nash Unsworth, Department of Psychology, University of Georgia

Previous research has shown that picture location is related to source memory overall, and

is in fact a measure of source memory. Source memory is the process by which memories are attributed to the original context or source. Thus, university undergraduates will complete a computer task in which the participant must decide if the image on the screen is old or novel and if the image is old, he/she must indicate the original location of the image. Moreover, past studies have shown a relationship between attributing the location of a picture to source memory. However, while a relationship between source memory and picture location has been shown, the question addressed by this study is whether working memory and source memory, as measured by the picture location task, are related, and if so how? According to the traditionalist view, working memory is memory that has been manipulated. However, the manipulation of memory is only one component of working memory. Cues and active maintenance are also important components that compose working memory. Therefore, the relationship between source memory and picture location seems too simple; this project postulates that there is also a correlation between working memory and source memory. Thus, by measuring high and low span differences of undergraduates completing computer tasks of working memory, this research project is aimed at investigating the nature of the relationship between source memory and working memory and to further elucidate and examine their more detailed components in performance.

Is Elevation of O-GlcNAc Levels Both Necessary and Sufficient to Extend Median Lifespan?

Wei Wang
Dr. Lance Wells, Department of Biochemistry & Molecular Biology, University of Georgia
Sandra Brimble & Enas Gad El-Karim, Department of Biochemistry & Molecular Biology, University of Georgia

From *C. elegans* to mice, reduced signaling through the insulin-like pathway extends both median and maximal lifespan. However, reduced signaling defined as insulin resistance also precedes and is the hallmark of type II diabetes. The laboratory has demonstrated previously that elevation in intracellular glycosylation of nuclear and cytosolic proteins via O-GlcNAc (carbohydrate modification) induces insulin resistance. More recently, the laboratory has demonstrated that the O-GlcNAc cycling enzymes (OGT that adds and OGA that removes the O-GlcNAc modification) modulate median lifespan in *C. elegans* and thus are modulating the insulin-like signaling pathway in the nematode. Having demonstrated that elevation of O-GlcNAc levels is sufficient to increase lifespan, the project focuses on whether or not it is necessary. The project is focused on measuring O-GlcNAc levels and mRNA and protein expression levels of the cycling enzymes in mutant strains of *C. elegans* that have elongated or shortened median and/or maximal lifespans. Furthermore, given that an OGT null mutant can suppress long-lived insulin mutants' median lifespan without altering maximal lifespan is of great interest since no other repressive mutant only alters one of these two criteria. Thus, several mRNA preparations from multiple strains for microarray analysis will be generated in order to identify key regulated genes that may be involved in longevity versus median lifespan. In conclusion, the results expected are that greater O-GlcNAc levels are indeed needed for increased median lifespan and that the microarray experiments will direct us towards the genes involved specifically in longevity.

Design Evolution of a Non-Electric Evaporative-Cooling Milk Container for Smallholder Farmers in East Africa

Aaron O. Watwood
Dr. William Kisaalita, Department of Biological & Agricultural Engineering, University of Georgia

Smallholder dairy farmers of East Africa must cool their fresh milk to four degrees Celsius in four hours in order to meet ISO standards for marketability. Ugandan dairy farmers, in particular, are not able to market their evening milk due to lack of cooling facilities, and thus must forfeit the potential revenue gained from it.

Through a design and research undergraduate program, we are developing a cooler that is non-electric and works by an evaporative-cooling mechanism that relies on vacuum and zeolite adsorption. Three designs have evolved thus far with varying constructions and performances. The first design, consisting of a separate zeolite container and on-site generated vacuum via a hand pump, exhibited inadequate cooling (30 to 25 centigrade degrees). The second design, independently conceived and commercialized by CoolSystems of Germany as "CoolKeg" for alcoholic beverages, achieved the desired cooling kinetics but lacked several attributes to be applicable under smallholder operating environment. In collaboration with CoolSystems, modifications have been incorporated into the second design to be compatible with smallholder dairy farmer practice, with milk cooling performance and maintenance being the primary concerns. This third design is undergoing performance testing with respect to cooling kinetics. Details of the third design will be presented with emphasis on the changes made to make it work for the smallholder dairy farmer in Eastern Africa.

Black Women and the Movements: Using Art to Re-Define Beauty

Delila D. Wilburn, CURO Summer Fellow
Dr. Barbara McCaskill, Department of English, University of Georgia

During the 1960s and the 1970s, the United States became the breeding ground for several organizations that sparked a series of social movements in favor of equal civil rights and liberties for minority groups. Breaking away from the strict political nature of other movements, the Black Arts Movement (BAM) emerged nationally from the African American community. BAM was a movement among black artists who valued art by and for black people, and who wanted to use art to help black people transform and improve their communities. The movement complied with the Black Vernacular Tradition, which encouraged African Americans to reject standard traditions, especially of cultural aesthetics, literary forms, and expressive art. Using the biographical resources available and the published work of the artists, my research profiles notable women associated with BAM. The profiled artists are the singer Nina Simone (1933-2003), and the poet and professor of English at Virginia Tech Nikki Giovanni (1943-present). These women used their songs and poems respectively not only as sources of inspiration for black women, but as voices of activism for all women alike. Their work influenced the rise of second wave feminism, a period of feminist activity during the 1960s and the 1970s, with profound critical messages on gendered racial politics and women's liberation. Their work—innovative and unconventional—display aesthetical messages that resonate as loudly as when they were first introduced to the American public: true beauty is defined not by compliance to traditional standards, but through non-conformity and originality.

Determining the Truth: The War on Terror and Repression in China

Ashley A. Wilkinson, Roosevelt @ UGA
Dr. David S. Williams, Honors Program, University of Georgia

Both human rights organizations and governments have long accused China of oppressing its Muslim Uighur population, of whom many are separatists. Since the War on Terror began, their criticisms of the Chinese government for its perceived persecution of Uighurs have increased. However, it may be difficult to establish whether bias has somehow contributed to charges of intensified human rights abuses. To produce less biased assertions, an automated events data coder can be used to assert whether human rights violations have actually increased. In order to determine the accuracy of the claims that China has repressed the Uighurs more after the War on Terror began, both Chinese rhetoric and acts of Chinese repression as reported in newspapers were analyzed using an automated events data coder. For the rhetoric, the data coder was used to search newspapers for the words Chinese officials and media used to describe Uighur

separatists from 1994-2007. The same software program was used to look for words describing acts of repression, such as torture, execution, and re-education, also from 1994-2007. After comparing and analyzing the data before and after the War on Terror began, and controlling for variables such as economic change, change in leaders, and dissent, preliminary results suggested that the War on Terror correlated with the Chinese crackdown. This case shows that automated events data coding may potentially provide a more trustworthy account of whether human rights have been violated in a given state.

Ending the Waiting List Crisis: Increasing Child Care Subsidy Funds

Ashley A. Wilkinson, Roosevelt @ UGA
Dr. Thomas McNulty, Department of Sociology, University of Georgia

Reliable child care enables parents to attain and maintain employment. In the past, the United States Congress recognized the importance of childcare, boosting subsidies for the service after the government increased work requirements during the 1996 restructuring of welfare. Today, the U.S. government encourages low-income families to get off welfare, but fails to adequately fund the child care subsidies these families need in order to work. Normally, the federal government provides states funds for child care subsidies through the Child Care Development Block Grant (CCDBG) and Temporary Aid for Needy Families (TANF). Unfortunately, since 2001, state budget deficits, inflation, and increased TANF work requirements have reduced the amount of money states receive to allocate for child care assistance. Because of this decrease in funding, seventeen states currently have waiting lists for child care subsidies, including Georgia. According to the federal government's inflation calculator, the United States must increase funds to the CCDBG by $460 million to cover the decreased value of the CCDBG's stagnant funding. In addition, advocacy groups claim that $3.8 billion must be spent to meet Congress's new work requirements for TANF, amounting to a combined total of $4.26 billion to be spent over the next five years. After reading articles and papers from the federal government, state governments, and advocacy groups, I have realized that while individual states are also responsible for child care subsidy waiting lists, the problems have begun at the federal level and should be resolved on that level first.

HIV/AIDS in India: A Case Study on the Influence of Traditional and Modern Indian Characteristics on the HIV/AIDS Epidemic among Indian Youth

Amy K. Winter
Dr. Nan McMurry, Department of History, University of Georgia

India is a dynamic country currently experiencing rapid economic development and societal change as well as a dangerous HIV/AIDS epidemic that has infected 2.5 million people. In the transition from a traditional identity of social conservatism and poor economic status to a modern world of open markets, consumerism, and growing western influences, Indian youth are a vulnerable demographic, accounting for 31% of India's AIDS cases while constituting only 25% of the population. The objective of this paper was to explore how both traditional and modern influences have affected the spread of HIV/AIDS in Indian youth. Specifically, I explored five traditional and modern Indian characteristics. The traditional characteristics are gender inequality, lack of sex education, and poverty. The modern characteristics are migration, and sexual liberalism. These five characteristics are interrelated and none are direct causes of HIV/AIDS, however, these characteristics foster situations that place Indian youth in positions of higher vulnerability to contracting HIV/AIDS. Where HIV/AIDS infection and transmission are concerned, India is caught between the worst of a traditional/underdeveloped country and a modern/developed country. Indian youth are the unfortunate population who are the recipients of both traditional and modern characteristics that position them in an environment where they are highly vulnerable to contracting HIV/AIDS.

Regional Comparison of the Legal Basis of Venture Philanthropy

Karen C. Wong, CURO Summer Fellow, CURO Scholar
Dr. Andrew Whitford, Department of Public Administration & Policy, University of Georgia

Venture philanthropy falls under social entrepreneurship and is the new trend in philanthropy. It is a social change investment vehicle and contains entrepreneurial activity in charitable organizations. It involves the application of corporate principles to nonprofits, long-term commitment, and high engagement. Venture philanthropists choose and assist certain non-profits with constructing and executing strategic plans that will lead to substantial growth and broad social impact. Venture philanthropists take a performance and results focused orientation. To achieve this aim, venture philanthropists incorporate fixed milestones and tangible return and exits into nonprofits. Venture philanthropists emphasize creating self-sustainability in a nonprofit. This research will examine the legal basis of venture philanthropy to better understand and analyze the motivation and characteristics of venture philanthropy groups. We hope to understand the legal formulation and governance of venture philanthropy groups in the United States. By studying the legal governance structure of venture philanthropy groups, we can better understand the structure and characteristics of venture philanthropy groups. After assessing basic legal agenda associated with venture philanthropy, the paper will conduct a study that compares the different legal foundations of venture philanthropy within different regions in the United States. We will analyze and compare the legal basis and governance of venture philanthropy groups cross-country to gain a diverse perspective.

Permeability of Intestinal Cells Exposed to Black Walnut Extract

Leilah D. Zahedi, CURO Apprentice
Dr. David Hurley, Department of Population Health, University of Georgia

Acute laminitis, a condition characterized by vascular dysfunction and inflammation in the hoof, occurs in horses that ingest or are exposed to shavings from Black Walnut trees. We hypothesize that a change in intestinal permeability, due to localized effects of an aqueous Black Walnut extract (BWE) play a role in the pathogenesis of laminitis. The increased permeability of the intestinal mucosa then allows movement of intestinal contents into the vascular system resulting in a systemic inflammatory response. Due to the design of the hoof, inflammation leads to a loss of perfusion, pain, and a potentially life threatening condition. To test our hypothesis, we measured changes in permeability of the tight junctions between human intestinal cells to fluorescent probes of various sizes. The cells were grown on filters separating two chambers, and incubated with BWE. We measured movement of these probes across the cells and compared those results with control samples. Preliminary results indicate low concentrations of BWE decreased tight junction permeability, but permeability increased as BWE concentrations increased. These results suggest that the amount of BWE ingested might be linked to whether leakage, and therefore inflammation occurs. Since the above experiments were conducted to establish methodology, conclusions on effects of BWE will be better determined when the protocols are conducted using equine intestinal cells. Those studies will give us a clearer picture of the effects of BWE on changes in intestinal permeability that could lead to laminitis.

Simulacrum Ring
Marilyn Zapf
Prof. Robert Jackson, Department of Jewelry/Metalsmithing, University of Georgia

My current research explores the line between the real and the reproduction. Moulds are taken from specific areas of the body and reconfigured into a landscape questioning how an image is created, how true a copy is to its original, and at what point a reproduction leaves what it signifies and becomes a reality in and of itself. The work, used in a jewelry context, emphasizes both its dependence on and departure from the body. The ring format relies on the finger for its function while simultaneously hiding the finger from view. In "Simulacrum Ring," moulds are taken from the knuckles of the hand, reconfigured, translated into silver, and returned to the body in its new orientation.

The Center for Undergraduate Research Opportunities is grateful to the following sponsors for underwriting the 2008 Symposium.

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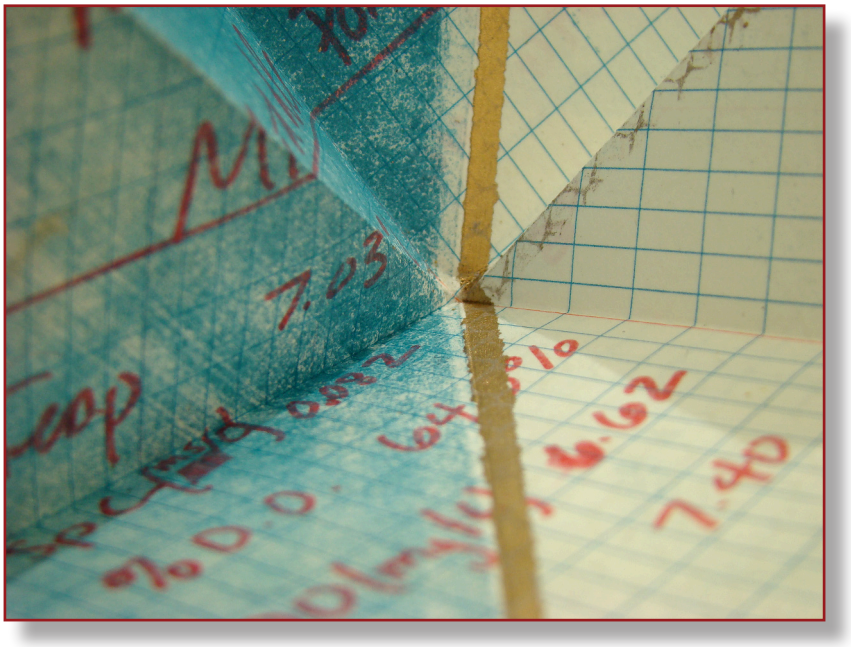
Center for Undergraduate Research Opportunities

Symposium 2009



April 6, 2009

Classic Center
Athens, Georgia

Program and Book of Abstracts

Creating a Culture of Undergraduate Inquiry

The Honors Program's
Center for Undergraduate Research Opportunities

2009 Symposium Program and Abstracts

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Table of Contents

CURO
Center for Undergraduate Research Opportunities

Symposium 2010

Classic Center
Athens, Georgia
Monday, March 29, 2010

CALL FOR ABSTRACTS

The Center for Undergraduate Research Opportunities at the University of Georgia provides a forum for undergraduates with a 3.4 GPA or who participate in a university-wide research program to present original research and creative works sponsored by faculty members. Undergraduate students from all disciplines are encouraged to participate. Representatives of public and private higher education institutions in Georgia are encouraged to apply.

Scholarly presentations may be in the form of an oral presentation, poster session, exhibition, performance, or work of art. Students can also present a tutorial about a research methodology or new technology. Undergraduate researchers who are at various stages of the research process are encouraged to submit abstracts describing where they are in the research process and the issues they face. Honors thesis students can also present in a Roundtable Forum. The Roundtables offer undergraduates pursuing an Honors thesis the opportunity to present their research to other thesis students working in the same discipline. Those who wish to present their work should submit an application and an abstract of a maximum of 250 words no later than **January 15, 2010** and a brief supporting letter from the sponsoring faculty member via the CURO web site no later than **January 25, 2010**. Group research projects should be submitted with one application and one letter of faculty support. All abstracts will receive graduate student peer review and feedback. All participants accepted into the Symposium will be notified by February 8, 2010, and their abstracts will be published in a book of abstracts. Sponsoring faculty are invited to preside at their students' sessions.

Best Paper Awards
Papers on work being presented at the CURO Symposium submitted by February 26, 2010 will be considered for Best Paper awards in the categories of humanities, social sciences, civic responsibility focus, international focus, and sciences. Papers must be submitted electronically to curo@uga.edu. Maximum length is 12 pages, double spaced, excluding references and appendices.

Purposes of the Symposium:
- To highlight excellence in research by undergraduate students
- To enrich the undergraduate experience by promoting communication and cooperation between faculty and students
- To provide a forum for undergraduates to communicate and disseminate their research findings and creative works
- To provide an opportunity for undergraduate researchers in the state of Georgia to engage with their peer researchers

Criteria for Selection:
- Originality and quality of research
- Quality of written abstract
- Ethical and responsible research
- Extent of the undergraduate student's involvement in development of the research design and execution of the project. Research presented at the Symposium should go beyond work completed for a class paper or project.
- Letter of support from supervising faculty

This event will be free and open to the public. All interested faculty and students are encouraged to attend the CURO 2010 Symposium. Free parking will be available at the Classic Center. Free UGA bus transportation will be available from specified locations. For more information, contact curo@uga.edu, (706) 542-5871.

JURO@GA The University of Georgia's Journal for Undergraduate Research Opportunities

CALL FOR SUBMISSIONS

The Journal for Undergraduate Research publishes original research papers in the areas of humanities, social sciences, and policy as well as art-related content. You **must present at the annual CURO Symposium in order to be eligible for publication**. Submissions are accepted throughout Spring semester at http://www.uga.edu/juro/.

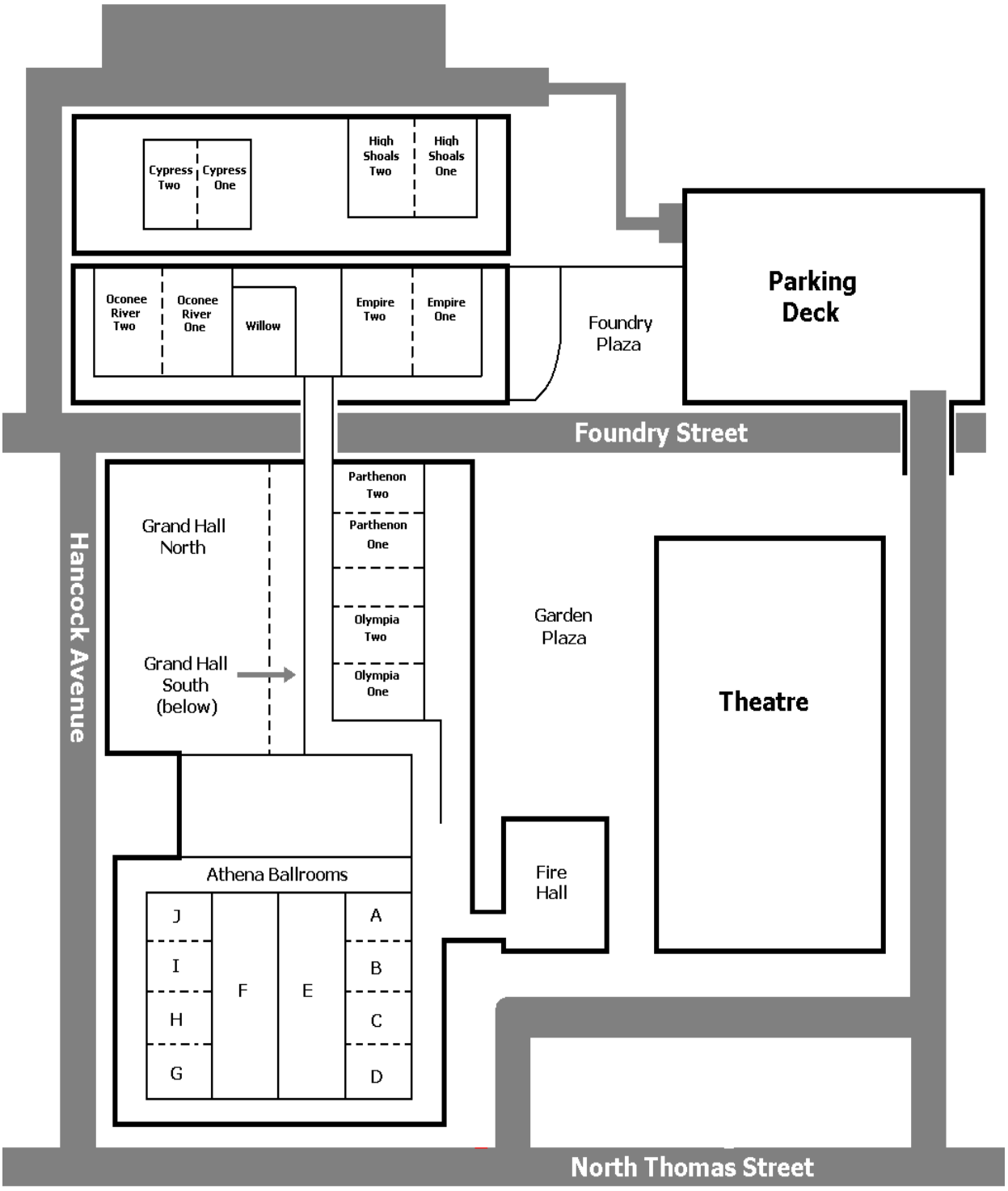
The following general format should be adhered to as closely as possible. The cover page should include the researcher's name, the faculty advisor's name, the institution attended, the researcher's major, and the year of anticipated graduation. This information should be followed immediately by the abstract. The research article itself may be organized into the following sections: introduction, methods, findings, conclusion, and references.

Additionally, work submitted to JURO@GA must adhere to the following guidelines:

1. Maximum length is thirty pages, double-spaced. Theses can be shortened to comprise the central idea of the research in order to be eligible for publication in the journal.
2. All submissions are submitted in English unless other arrangements are made.
3. All work must be submitted with an abstract no longer than 250 words. The abstract should provide a background sufficient to establish a context for understanding the research, summarize the research article itself, and highlight the major results.
4. References should be organized according to the standard format for the individual discipline the research topic falls under, e.g. Modern Language Association, Council of Biology Editors, American Psychological Association, or Chicago style format.
5. Work must be fully represented in digital form (preferably a Microsoft Word document for papers) and emailed to juro@uga.edu.
6. All submissions must be accompanied by a completed Submission and Faculty Advisor Approval Form found on the website at http://www.uga.edu/juro/.

All submissions will be evaluated according to criteria established by the editorial staff of the journal. All incoming research will be reviewed first by JURO@GA's content editors and other staff members. All prospective publications are subject to the approval of the journal's Editor-in-Chief. Upon completion of the review, the author may expect to receive either a notification of acceptance, acceptance with revisions, or a rejection of submission. Any questions about the submission process or the journal itself should be directed to juro@uga.edu. JURO@GA wishes you the best of luck with your submission and looks forward to reviewing the finished product of your hard work.

Contact JURO @ JURO@uga.edu or visit our website at http://www.uga.edu/juro/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Cypress One
High Shoals Two
High Shoals One
Oconee River Two
Oconee River One
Willow
Empire Two
Empire One
Foundry Plaza
Parking Deck
Foundry Street
Parthenon Two
Parthenon One
Olympia Two
Olympia One
Grand Hall North
Grand Hall South (below)
Hancock Avenue
Garden Plaza
Theatre
Athena Ballrooms
J
I
H
G
F
E
A
B
C
D
Fire Hall
North Thomas Street

Monday, April 6, 2009

Begin registration of oral and poster presenters; Students hang up posters — **8:30 a.m.**
Classic Center, Lobby

Concurrent Oral Sessions — **10:10 a.m.**
Classic Center, Athena Breakout Rooms A, B, C, D, G, H, I, J

Thesis Roundtable Session — **10:10 a.m.**
Classic Center, Parthenon Room

Concurrent Oral Sessions — **11:15 a.m.**
Classic Center, Athena Breakout Rooms A, B, C, D, G, H, I, J

Thesis Roundtable Session — **11:15 a.m.**
Classic Center, Parthenon Room

Concurrent Oral Sessions — **12:20 p.m.**
Classic Center, Athena Breakout Rooms A, B, C, D, G, H, I, J

Concurrent Oral Sessions — **1:25 p.m.**
Classic Center, Athena Breakout Rooms A, B, C, D, I, J

Concurrent Oral Sessions — **2:30 p.m.**
Classic Center, Athena Breakout Rooms A, B, C, D, J

Welcome and Opening Session — **4:00 p.m.**
Classic Center, Athena Ballroom E
Dr. David S. Williams
Director, Honors Program
Dr. Arnett C. Mace, Jr.
Senior Vice President for Academic Affairs and Provost

Recognition of CURO Promising Scholars
Dr. Pamela B. Kleiber
Associate Director, Honors Program

Introduction of Keynote Speaker
Bryan Davis
Former CURO Apprentice
BBA/MA Accounting Candidate

Keynote Address: *"Where the Boys Aren't": Sex-Ratio Imbalances and Risky Sexual Behavior*
Professor Chris Cornwell
Head and Professor, Department of Economics

Announcement of Excellence in Undergraduate Research Mentoring Award
Professor Jere Morehead
Vice President for Instruction

Poster Session **5:00 p.m.**
Classic Center, Grand Hall (downstairs)

CURO Apprentice & Promising Scholars Dinner **6:15 p.m.**
Classic Center, Olympia Room

Art Gallery Talks **6:15 p.m.**
Classic Center, Fire Hall

Dr. Pamela B. Kleiber
Associate Director, Honors Program
Professor Georgia Strange
Director, Lamar Dodd School of Art
Mr. Mark Callahan
Artistic Director, Ideas for Creative Exploration

Announcement of CURO Summer Research Fellows, CURO Scholars, UGA Libraries Undergraduate Research Awards, and Best Paper Awards **8:00 p.m.**
Classic Center, Fire Hall

Dr. David S. Williams
Director, Honors Program
Ms. Florence E. King
Assistant University Librarian for Human Resources,
Director, Miller Learning Center Electronic Library
Ms. Deborah Dietzler
Executive Director, UGA Alumni Association

Monday, April 6, 2009

Concurrent Oral Sessions

Classic Center, Athena Breakout Rooms A, B, C, D, G, H, I, J

10:10 – 11:00 a.m. First Concurrent Session

Room A	**Maren Smith**	Senescence and the Y Chromosome
	Faculty Mentor	Dr. Kelly Dyer, Department of Genetics
	Shelina Ramnarine	Understanding the Cell Cycle: Cyclin-Dependent Kinase Phosphorylation of Hcm1
	Faculty Mentor	Dr. Wyatt Anderson, Department of Genetics
	Matthew Belcher	Determinants in the Localization of Telomerase to Telomeres
	Faculty Mentor	Dr. Michael Terns, Department of Biochemistry & Molecular Biology
Room B	**Amanda Farmer**	Adverse Effects After Administration of an Ionic Iodinated Contrast Media in Dogs
	Faculty Mentor	Dr. Erik Hofmeister, Department of Small Animal Medicine
	Laura Harrison	Presence of Apoptosis, as Determined by Immunohistochemistry, in Lymphoid Tissues of Chickens Infected with Strains of Newcastle Disease Virus of Varying Virulence
	Faculty Mentor	Dr. Corrie Brown, Department of Veterinary Pathology
	Sean O'Rourke	Neuromuscular Activation and Movement Kinematics Exhibited During Sit-to-Stand by Multiple Sclerosis Individuals
	Faculty Mentor	Dr. Kathy Simpson, Department of Kinesiology
Room C	**Talia Bromstad**	In The Field: Understanding Science Through the Book Arts
	Faculty Mentor	Prof. Amanda Burk, Department of Printmaking
	Caitlin Christopher	*Intoxicating Misery*
	Faculty Mentor	Prof. Bala Sarasvati, Department of Dance
	Katelyn Foley	Catching the Zanies: Italian Acting and English Drama
	Faculty Mentor	Dr. Erin Kelly, Department of English
Room D	**Stefann Plishka**	Imagining Constantinople: Imperial Houses of Worship as Symbols of State Ideology
	Faculty Mentor	Dr. Asen Kirin, Department of Art History
	Michael Slade	The Chariot Above the Heavens and the Ladder Upon the Earth: An Exploration of Love in the Writings of Plato
	Faculty Mentor	Dr. Frank Harrison, Department of Philosophy

	Elizabeth Katz	How Has the Gospel of John Been Used to Denigrate the Jews?
	Faculty Mentor	Dr. Wayne Coppins, Department of Religion
Room G	**Lauren Coleman**	Child Care Foundations: A Model for Employer-Based Child Care Subsidies in Athens-Clarke County, Georgia
	Faculty Mentor	Dr. Amy Kay, Department of Child & Family Development
	Catherine Mencher	Food for Thought: A Comprehensive Overhaul of American Food Aid Policy
	Faculty Mentor	Dr. Stacey Mitchell, Department of International Affairs
	Carolyn Crist	News in the Black Belt: Teaching Journalists How to Cover Poverty in Persistently Poor Counties
	Faculty Mentor	Prof. John Greenman, Department of Journalism
Room H	**Corbin Busby, Shelby Jones**	Validity of English
	Faculty Mentor	Dr. Sujata Iyengar, Department of English
	Laura Leidner	Poetic Pedagogy: Teaching Creative Writing at Coile Middle School
	Faculty Mentor	Dr. Melisa Cahnmann-Taylor, Department of Language & Literacy Education
	Jeremy Akin	Answering the Call for Equity, Relevance, and Inclusion: Rethinking the Role of the Disciplinary Alternative Education in the Savannah-Chatham County Public School System
	Faculty Mentor	Dr. Larry Nackerud, School of Social Work
Room I	**Robert Jacques**	Drugs and Deterrence
	Faculty Mentor	Dr. Mark Cooney, Department of Sociology
	Katherine Cherry	Zero-Tolerance Illicit Drug Dependence Policy in the United States Military: A Need for Revision
	Faculty Mentor	Dr. Paul Roman, Department of Sociology
	Milner Owens	The Empowerment of Character Expression Through the Use of Popular Culture in the Novels of Manuel Puig
	Faculty Mentor	Dr. Ángel Nicolás Lucero, Department of Romance Languages
Room J	**Alice Meagher**	Improving the Activity of the Heterologously Expressed Soluble Hydrogenase I from *Pyrococcus furiosus* Through the Modification of the BW25113 (*E. coli* K12) Genome
	Faculty Mentor	Dr. Michael Adams, Department of Biochemistry & Molecular Biology
	Muktha Natrajan	The Role of Integrin Activation in Increased Gliogenesis of Human Neural Stem Cell Cultures
	Faculty Mentor	Dr. Steven Stice, Department of Animal & Dairy Science

	Vandana Murty	Development of Alternate Sources of Macronutrients for a Sustainable Algal Biofuel System
	Faculty Mentor	Dr. Keshav Das, Department of Biological & Agricultural Engineering

10:10 – 11:00 a.m. First Thesis Roundtable Session

Classic Center, Parthenon Room

Table 1	**Brian Gardner**	Analysis of Pectate Lyase Activity in Pectin-Rich Lignocellulosic Biomass Fermentations
	Faculty Mentor	Dr. Joy Doran-Peterson, Department of Microbiology
	Jean Chi	Wing Morphology, Flight Ability and Immune Measures in Monarch Butterflies
	Faculty Mentor	Dr. Sonia Altizer, Odum School of Ecology
	Calley Mersmann	Thermal Adaptation and Substrate Limitation of Heterotrophic Soil Microorganisms
	Faculty Mentor	Dr. Mark Bradford, Odum School of Ecology
	Amanda Perofsky	Comparing Population Size Estimators for Larval Stream Plethodontids
	Faculty Mentor	Dr. John Maerz, Department of Wildlife
Table 2	**Yu-Chien Cheng**	Towards Generating a *C. elegans* Cell Line: Deregulating the Seam Cell Division Pattern by Inactivating Genes Involved in Cell Differentiation
	Faculty Mentor	Dr. Edward Kipreos, Department of Cellular Biology
	Wei Wang	Differential Regulation of Oxidative and Thermal Stress Tolerance Upon Changes in Levels of O-GlcNAc Modified Proteins *in vivo*
	Faculty Mentor	Dr. Lance Wells, Department of Biochemistry and Molecular Biology
	Neil Pfister	Characterizing RNA-Protein Complexes Involved in Genome Defense in Prokaryotes
	Faculty Mentors	Dr. Michael Terns and Dr. Rebecca Terns, Department of Biochemistry & Molecular Biology
Table 3	**Aileen Thomas**	Human Random Capacities Through Repeated Numeric Sampling
	Faculty Mentor	Dr. Nicole Lazar, Department of Statistics
	Hunter Wilson	8-Chloro-7-hydroxyquinoline and Xanthone Acetic Acid Derivatives as Photoremovable-Protecting Groups with Susceptibility to Two-Photon Excitation
	Faculty Mentor	Dr. Timothy Dore, Department of Chemistry

	Tulsi Patel	Directed Differentiation of Neural Progenitor Cells into Glial Progenitor Cells
	Faculty Mentor	Dr. Steven Stice, Department of Animal & Dairy Science
	Prashant Monian	Analysis of Phospholipids in Neuronal Tissue Using Electrospray Ionization-Mass Spectrometry
	Faculty Mentor	Dr. Brian Cummings, Department of Pharmaceutical & Biomedical Sciences
Table 4	**Wes Jackson**	From Hills to Plains: Cormac McCarthy's Use of Terrain, Landscape, and Environment
	Faculty Mentor	Dr. Hugh Ruppersburg, Department of English
	Kelly Nielsen	Changing Places: Examining the Role of Place in Invisible Theatre Performance
	Faculty Mentor	Prof. George Contini, Department of Theatre & Film Studies
	Liana Hervas	Indigenous Peoples and Migrants: New Nationalism in Ecuador
	Faculty Mentor	Dr. Pamela Voekel, Department of History
	Rebecca Corey	*Lay Down Your Heart*, a Travel Memoir
	Faculty Mentor	Prof. Reginald McKnight, Department of English
Table 5	**Madison Moore**	Behavioral Changes Following Daily Practice of Saccade Tasks in Schizophrenia
	Faculty Mentor	Dr. Jennifer McDowell, Department of Psychology
	Devin Smith	Using fMRI and Neuropsychological Tests to Index Brain Function Following a History of Multiple Concussions
	Faculty Mentor	Dr. L. Stephen Miller, Department of Psychology
	Benjamin Perlow	The Ideal Religious Experience
	Faculty Mentor	Dr. Leonard Martin, Department of Psychology
	Nathan Raley	An Analysis of the Effects of Parent-Child Quality of Relationship and Parental Emotion Socialization Practices on Youth Psychosocial Functioning
	Faculty Mentor	Dr. Cynthia Suveg, Department of Psychology

11:15 – 12:05 p.m. Second Concurrent Session

Classic Center, Athena Breakout Rooms A, B, C, D, G, H, I, J

Room A	**Alex Johnson**	Early Voting in Georgia: A Compromise for Accessibility and Efficiency
	Faculty Mentor	Dr. Charles Bullock, Department of Political Science

	Jonathan Lee	Georgia's Forest Biomass and the 2007 Energy Bill: What's Wrong and How to Fix It
	Faculty Mentor	Dr. Robert Izlar, Department of Forest Resource Management/Renewable Natural Resources Policy
	Caitlin McLaughlin	The Absence of Term Limits in the Constitution: Motivations of the Framers
	Faculty Mentor	Dr. Daniel Kapust, Department of Political Science
Room B	**Caroline Colden**	Vesicular Stomatitis Virus in Infected Cattle
	Faculty Mentor	Dr. Corrie Brown, Department of Veterinary Pathology
	Amanda Farmer	The Effects of Extubation with Varying Degrees of Endotracheal Tube Cuff Inflation on Endotracheal Fluid Volume in the Dog
	Faculty Mentor	Dr. Erik Hofmeister, Department of Small Animal Medicine
	Amina Farooq	Analysis of the Transcriptional Regulation of Pax6 in the Eye
	Faculty Mentor	Dr. James D. Lauderdale, Department of Cellular Biology
Room C	**Kathryn Pyne**	Approaches to the Refugee Humanitarian Crisis: An Examination of Refugee Trends and What Promotes Progress
	Faculty Mentor	Dr. Jerry Legge, Department of Public Administration & Policy
	Meredith Jones	Policy on the Crisis in Northern Uganda
	Faculty Mentor	Dr. Maurits van der Veen, Department of International Affairs
	Jessica Craven, Sarah Alongi	Marketing the Non-Profit Global Text Project to Universities in Developing Economies
	Faculty Mentor	Dr. Richard Watson, Department of Management Information Systems
Room D	**Lindsay Jones**	Characterization of an RNP Complex Involved in Invader Defense in *Pyrococcus furiosus*
	Faculty Mentors	Dr. Michael Terns and Dr. Rebecca Terns, Department of Biochemistry & Molecular Biology
	Yu-Chien Cheng	Towards Generating a *C. elegans* Cell Line: Deregulating the Seam Cell Division Pattern by Inactivating Genes Involved in Cell Differentiation
	Faculty Mentor	Dr. Edward Kipreos, Department of Cellular Biology
	Wei Wang	Differential Regulation of Oxidative and Thermal Stress Tolerance Upon Changes in Levels of O-GlcNAc Modified Proteins *in vivo*
	Faculty Mentor	Dr. Lance Wells, Department of Biochemistry & Molecular Biology

Room G	**Emily Yeager**	Kennedy, Carter, and Obama: The Role of Faith in Three Democratic Presidential Campaigns
	Faculty Mentor	Dr. D. Jason Berggren, Department of Political Science
	Joe Reynolds	On Faith
	Faculty Mentor	Dr. Frank Harrison, Department of Philosophy
	Sana Hashmi	Buddha and Uncle Sam: Investigating Contemporary Buddhism in the United States and Its Evolution
	Faculty Mentor	Dr. David S. Williams, Department of Religion
Room H	**Leigh Tankersley, Robert J Gentry, Heather E Howell**	How Parental Gender Beliefs Affect Children's Preference for Gender Stereotyped Toys in Low-Income Families
	Faculty Mentor	Dr. Tsu-Ming Chiang, Department of Psychology, Georgia College & State University
	Jessica Van Parys	Analyzing the Gender Gap in Educational Achievement in Children Ages 5-12
	Faculty Mentor	Dr. David Mustard, Department of Economics
	Marie Clark, Alexandru Muresan	*Why So* – Exploring Non Conventional Roles of the Male and Female in Dance Partnering
	Faculty Mentor	Prof. Bala Sarasvati, Department of Dance
Room I	**Wes Jackson**	From Hills to Plains: Cormac McCarthy's Use of Terrain, Landscape, and Environment
	Faculty Mentor	Dr. Hugh Ruppersburg, Department of English
	Kelli Canterbury	Changes in Cooking and Eating Practices of Griffin, Georgia
	Faculty Mentor	Dr. William Kretzschmar Jr., Department of English
	Yasmin Yonis	Expansion and Improvement of the Solar Cooker Project to Reduce Gender Based Violence
	Faculty Mentor	Dr. Njeri Marekia-Cleaveland, Carl Vinson Institute of Government
Room J	**Robert Bennett**	Modeling HLHS: Living with Half a Heart
	Faculty Mentor	Dr. William Kisaalita, Department of Biological & Agricultural Engineering
	Erin Kennedy	Mandatory Health Insurance: A Necessary Change
	Faculty Mentor	Dr. Audrey Haynes, Department of Political Science
	Donald Snyder	Examining the Attitudes of Georgians Toward Universal Health Care and the Consumption Tax
	Faculty Mentor	Dr. James Bason, Survey Research Center

11:15 – 12:05 p.m. Second Thesis Roundtable Session

Classic Center, Parthenon Room

Table 1	**Elizabeth Katz**	A Reception History of "the Jews" in the Gospel of John
	Faculty Mentor	Dr. Wayne Coppins, Department of Religion
	Hadas Peles	U.S. Involvement in Government Coups in Angola During the Cold War
	Faculty Mentor	Dr. Tim Cleaveland, Department of History
	Chris Chiego	Electoral Violence in Kenya: 1997–2008
	Faculty Mentor	Dr. John Morrow, Department of History
Table 2	**Joshua Sumislawski**	The Neurotrophic Action of Botulinum Neurotoxin
	Faculty Mentor	Dr. Julie Coffield, Department of Physiology & Pharmacology
	Diana Murro	Creation of a Transposon Mutant Library in Live Vaccine Strain *Francisella tularensis*
	Faculty Mentor	Dr. Russell Karls, Department of Infectious Diseases
	Rachel Nix	The Effects of Fetal Genomic Expression of TNF-aRI and RII in *P. chabaudi chabaudi* Complicated Murine Pregnancy
	Faculty Mentor	Dr. Julie Moore, Department of Infectious Diseases
	Lauren Kelly	Fibrin Deposition in the Malaria-Infected Placenta: A Disruption in the Balance Between Coagulation and Fibrinolysis
	Faculty Mentor	Dr. Julie Moore, Department of Infectious Diseases
Table 3	**Jordan Dalton**	*Meat Out of the Eater*
	Faculty Mentor	Mr. Mark Callahan, Artistic Director, Ideas for Creative Exploration
	Noah Koon	Detuning London: Street Musicians and the Noise Suppression Campaign in Victorian London
	Faculty Mentor	Dr. Steven Soper, Department of History
	Sarah Smith	The Dehumanization of War and the Female Condition
	Faculty Mentor	Dr. Hyangsoon Yi, Department of Comparative Literature
	Milner Owens	The Empowerment of Character Expression Through the Use of Popular Culture in the Novels of Manuel Puig
	Faculty Mentor	Dr. Ángel Nicolás Lucero, Department of Romance Languages
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Table 4	**Laura Harrison**	Presence of Apoptosis as Determined by Immunohistochemistry in Lymphoid Tissues of Chickens Infected with Strains of Newscastle Disease Virus of Varying Virulence
	Faculty Mentor	Dr. Corrie Brown, Department of Veterinary Pathology

	Caroline Sumners	Neuropeptide Signaling in *Drosophila*: A Cell-Specific Functional Dissection of the Proprotein Processing Protease *Amontillado* (*amon*)
	Faculty Mentor	Dr. Michael Bender, Department of Genetics
	Lindsay Stein	Using Immunohistochemistry for the Detection of Rabies Antigen in Various Mammalian Species
	Faculty Mentor	Dr. Corrie Brown, Department of Veterinary Pathology
	Nithya Natrajan	Human Disease and the Kit/KitL Signaling Pathway
	Faculty Mentor	Dr. Mary Bedell, Department of Genetics

12:20 – 1:10 p.m. Third Concurrent Session

Classic Center, Athena Breakout Rooms A, B, C, D, G, H, I, J

Room A	**Laura Harrison**	Advance Directive Reform: Reducing Medicare Spending and Increasing Respect of Patients' Rights
	Faculty Mentor	Dr. Claire Robb, Department of Epidemiology & Biostatistics
	Alexander Orellana	Berg Balance Score Correlates to Postural Stability Measures
	Faculty Mentor	Dr. Cathleen Brown, Department of Kinesiology
	Thomas Shaffer	Heart Rate Monitoring is Superior to Accelerometry as an Estimator of Human Energy Expenditure During Physical Activity
	Faculty Mentor	Dr. James Hargrove, Department of Foods & Nutrition
Room B	**Jennifer Tooher, Jaharris Collier**	Effects of Vertebral Fusion on Lateral Bending Spinal Motion of Women with Adolescent Idiopathic Scoliosis (AIS)
	Faculty Mentor	Dr. Kathy Simpson, Department of Kinesiology
	Jung Kim	Imaging of Seizure-Induced Ca2+ Waves in Developing Zebrafish
	Faculty Mentors	Dr. Andrew T. Sornborger, Department of Mathematics and Dr. James D. Lauderdale, Department of Cellular Biology
	Christine Tarleton	The Evolution of a Scientific Community Through Social Network Analysis: The Case of Autism
	Faculty Mentor	Dr. Shane Hamilton, Department of History
Room C	**Anthony Pelli**	"He Can't Do This To Me!" Military Assistance, the Response of Concerned Powers, and Implications for U.S. Aid to Ukraine
	Faculty Mentor	Dr. Dmitriy Nikonov, Center for International Trade & Security

	Joshua Gloster	H-1B Visa and Green Card Reform
	Faculty Mentor	Dr. Scott Atkinson, Department of Economics
	Julie Patel	Which Factors Influence the Voting Practices of the Members of the United Kingdom Parliament on Legislation Concerning the Use of Force by the State in Military Interventions?
	Faculty Mentor	Dr. Patricia Sullivan, Department International Affairs
Room D	**Long Doan**	Moods, Emotions, and Occupational Identities: A Test of Affect Control Theory
	Faculty Mentor	Dr. Dawn Robinson, Department of Sociology
	Anna Wilson	Defining and Regaining the Human Identity: Queries of Existence in Frederick Douglass's *Narrative*
	Faculty Mentor	Dr. Ron Miller, Department of English
	Laura Wynn	A Sense of Self: Questions of Identity in Contemporary Novels by Second-Generation Turkish-German Women Writers
	Faculty Mentor	Dr. Martin Kagel, Department of Germanic & Slavic Languages
Room G	**Marcus Hines**	Analyzing the Function of O-GlcNAc in the *Drosophila* Nervous System
	Faculty Mentors	Dr. Michael Tiemeyer and Dr. Lance Wells, Department of Biochemistry & Molecular Biology
	Neil Pfister	Characterizing RNA-Protein Complexes Involved in Genome Defense in Prokaryotes
	Faculty Mentors	Dr. Michael Terns and Dr. Rebecca Terns, Department of Biochemistry & Molecular Biology
	Meagan Cauble	Dispersion of Carbon Nanotubes in Aqueous Solution
	Faculty Mentor	Dr. Marcus Lay, Department of Chemistry
Room H	**Daniel Cellucci**	SONAR and Art: The Application of Sound to Underwater Sculpture
	Faculty Mentor	Prof. Ralph Brown, Department of Sculpture & Studio Foundations
	Kelly Nielsen	Changing Places: Examining the Role of Place in Invisible Theater Performance
	Faculty Mentor	Prof. George Contini, Department of Theatre & Film Studies
	Brittany Norman	Art & Engineering: A Binocular Vision
	Faculty Mentor	Prof. Martijn van Wagtendonk, Department of Studio Foundations
Room I	**Giridhar Subramanian**	Power and Influence in Southeast Asia: A Study of the Methods Used by India, China, Japan, and the United States
	Faculty Mentor	Dr. Brock Tessman, Department of International Affairs

	Charles Ford	Approaching Iran: Alternative Diplomacy
	Faculty Mentor	Dr. Sherry Lowrance, Department of International Affairs
	Liana Hervas	Indigenous Peoples and Migrants, New Nationalism in Ecuador
	Faculty Mentor	Dr. Pamela Voekel, Department of History
Room J	**Megan Matuszak, Brandi Kelley, Melissa Roth, Rachel Zudekoff**	The Relationship Between Parental Disciplinary Practices and Children's Social and Emotional Competence in Low-Income Families
	Faculty Mentor	Dr. Tsu-Ming Chiang, Department of Psychology, Georgia College & State University
	Nathan Raley	An Analysis of the Effects of Parent-Child Quality of Relationship and Parental Emotion Socialization Practices on Youth Psychosocial Functioning
	Faculty Mentor	Dr. Cynthia Suveg, Department of Psychology
	Manouela Valtcheva	Antisaccade Performance and Deficit Characteristics in a Normal Population
	Faculty Mentor	Dr. Jennifer McDowell, Department of Psychology

1:25 – 2:15 p.m. Fourth Concurrent Session

Classic Center, Athena Breakout Rooms A, B, C, D, I, J

Room A	**Brian Watts**	Thermal Adaptation of Soil Microbial Respiration in Laboratory Microcosms
	Faculty Mentor	Dr. Mark Bradford, Odum School of Ecology
	Joseph Rimando	Evaluating the Antibody Response to Respiratory Syncytial Virus (RSV) for the Inhibition of the RSV G Protein Interaction with the CX3C Chemokine Receptor
	Faculty Mentor	Dr. Ralph Tripp, Department of Infectious Diseases
	Agni Chandora	Use of Cholera as a Metaphor in *Death in Venice*: Health Administrational Aspects and Gustav Aschenbach's Journey
	Faculty Mentor	Dr. Frances Teague, Department of English
Room B	**Jennifer Lee**	Biopsychosocial Factors and Healthcare Utilization in Children With Non-Cardiac Chest Pain
	Faculty Mentor	Dr. Ronald Blount, Department of Psychology
	Tracy Yang	Simplification of Eligibility Requirements for PeachCare for Kids: Increasing Health Insurance Coverage for Georgia's Children
	Faculty Mentor	Dr. Phaedra Corso, Department of Health Policy & Management

	Katherine McGlamry	Glycan Interactions and the Development and Spread of Cancer Cells
	Faculty Mentor	Dr. Michael Tiemeyer, Department of Biochemistry & Molecular Biology
Room C	**Madison Moore**	Behavioral Changes Following Daily Practice of Saccade Tasks in Schizophrenia
	Faculty Mentor	Dr. Jennifer McDowell, Department of Psychology
	Hemali Vin	Measuring the Orderliness of Thought
	Faculty Mentor	Dr. Michael Covington, Institute for Artificial Intelligence
	Ash Sechler	*Borrowed Building*/*Search Cycle*
	Faculty Mentor	Mr. Mark Callahan, Artistic Director, Ideas for Creative Exploration
Room D	**Tyler Kelly**	String Theory and Its Mathematics
	Faculty Mentor	Dr. Elham Izadi, Departments of Mathematics
	Dillon Horne	The Development and Implications of Predictive Modes of Thought from the Renaissance to Modernity
	Faculty Mentor	Dr. Thomas Cerbu, Department of Comparative Literature
	Daisy Whelan	Weaving the Fog
	Faculty Mentor	Prof. Clay McLaurin, Department of Fabric Design
Room I	**Amy Davis**	Late Ming Dynasty Jingdezhen Ceramics in a Changing Economic and Cultural Context
	Faculty Mentor	Dr. Ari Levine, Department of History
	Jillian Kornau	Manicures: Not Just Paying for Pretty Nails
	Faculty Mentor	Dr. Katalin Medvedev, Department of Textiles, Merchandising, & Interiors
	Marilyn Zapf	Jewelry in the Age of Postmodernism
	Faculty Mentor	Prof. Mary Pearse, Department of Jewelry & Metalwork
Room J	**Jeff Shapiro**	Male Song Performance Correlates of Reproductive Success and Morphological Characters in the Dark-Eyed Junco (*Junco hymemalis*)
	Faculty Mentor	Dr. Dustin Reichard, Department of Biological Sciences
	Jean Chi	Wing Morphology, Flight Ability, and Immune Measures in Monarch Butterflies
	Faculty Mentor	Dr. Sonia Altizer, Odum School of Ecology
	Amanda Perofsky	Comparing Population Size Estimators for Stream Plethodontids
	Faculty Mentor	Dr. John Maerz, Department of Wildlife

2:30 – 3:45 p.m. Fifth Concurrent Session

Classic Center, Athena Breakout Rooms A, B, C, D, J

Room A	**Christine Akoh**	Cloning and Expression of a *Burkholderia pseudomallei* DNA Fragment Specifying an Adherence Factor
	Faculty Mentor	Dr. Eric Lafontaine, Department of Infectious Diseases
	Diana Murro	Creation of a Transposon Mutant Library in Live Vaccine Strain *Francisella tularensis*
	Faculty Mentor	Dr. Russell Karls, Department of Infectious Diseases
	Shruti Suresh	Isolation and Identification of Novel Acidobacteria and Verrucomicrobia from Forest Soil
	Faculty Mentor	Dr. William Whitman, Department of Microbiology
Room B	**Nima Patel**	Georgia Senate Bills 440 and 441: The Effectiveness of the Adult Criminal System as a Deterrent to Juvenile Recidivism
	Faculty Mentor	Dr. Edwin Risler, School of Social Work
	Robert Rosenbleeth	Reducing Binge Drinking Among University of Georgia Students
	Faculty Mentor	Dr. Elaine Weeks, Department of Sociology
	Rocky Cole	Mandatory Impact Fees: A New Growth Management Strategy for Georgia
	Faculty Mentor	Dr. Andrew Carswell, Department of Housing and Consumer Economics
Room C	**Jarrad Rowse**	Characterizing the STE23 ORF
	Faculty Mentor	Dr. Walter Schmidt, Department of Biochemistry & Molecular Biology
	Cleveland Piggott	The Role of Microtubules in the Degradation of Hirano Bodies
	Faculty Mentors	Dr. Marcus Fechheimer and Dr. Ruth Furukawa, Department of Cellular Biology
	Neeraj Sriram	Exclusive Consumption of Sugars as a Biological Means to Convert Lignocellulosic Hydrolysates Effectively
	Faculty Mentor	Dr. Mark Eiteman, Department of Biological & Agricultural Engineering
Room D	**Abby Wong**	Preventative Medicine in Water Supplies: A Remodeling of Disaster Relief
	Faculty Mentor	Dr. Angela Fertig, Department of Health Policy & Management
	Reid Brown, Jessica Sterling	Watershed Land Use Effects on Carbon Processing in Streams
	Faculty Mentor	Dr. Amy Rosemond, Odum School of Ecology

	Jarred Klorfein	Cap and Trade: A Comprehensive Solution to Georgia's Water Problem
	Faculty Mentor	Dr. Todd Rasmussen, Department of Water & Soil Resources
Room J	**Abigail Wilson**	Bolivian Wrestlers in Skirts
	Faculty Mentor	Dr. Katalin Medvedev, Department of Textiles, Merchandising & Interiors
	Celina Correa	Puerto Rican Feminist Thought: Boricua
	Faculty Mentor	Dr. Doris Kadish, Department of Romance Languages
	Malorie McCloy	Altered Surfaces: Fabric Manipulation and Design
	Faculty Mentor	Prof. Clay McLaurin, Department of Fabric Design

4:00 p.m. Welcome and Opening Session

Classic Center, Athena Ballroom E

Introductions and Welcome	Dr. David S. Williams, Director, Honors Program Dr. Arnett C. Mace, Jr., Senior Vice President for Academic Affairs and Provost
Recognition of CURO Promising Scholars	Dr. Pamela B. Kleiber, Associate Director, Honors Program
Introduction of Keynote Speaker	Bryan Davis, Former CURO Apprentice, BBA/MA Accounting Candidate
Keynote Address ***"Where the Boys Aren't: Sex-Ratio Imbalances and Risky Sexual Behavior"***	Professor Chris Cornwell, Head and Professor, Department of Economics
Excellence in Undergraduate Research Mentoring Awards	Professor Jere Morehead, Vice President for Instruction

5:00 p.m. Poster Presentations

Classic Center, Grand Hall (downstairs)

Poster #1	**Erin Kennedy**	Mandatory Health Insurance: A Necessary Change
	Faculty Mentor	Dr. Audrey Haynes, Department of Political Science
Poster #2	**Rocky Cole, Chris Chiego**	A Season of (Info) Sharing: An Empirical Investigation of Intelligence Reform
	Faculty Mentor	Dr. Loch Johnson, Department of International Affairs

Poster #3	**Al W. Ray, III**	Steamed Ginger Supplementation Reduces Pain Following Eccentric Exercise-Induced Injury
	Faculty Mentor	Dr. Patrick O'Connor, Department of Kinesiology
Poster #4	**Rachel Doyle**	The Effects of Corticosterone on Stress-Induced Weight Loss and Corticotrophin Releasing Factor (CRF) mRNA Expression in the Paraventricular Nucleus of the Hypothalamus (PVN)
	Faculty Mentor	Dr. Ruth Harris, Department of Foods & Nutrition
Poster #5	**Thomas Shaffer**	Heart Rate Monitoring is Superior to Accelerometry as an Estimator of Human Energy Expenditure During Physical Activity
	Faculty Mentor	Dr. James Hargrove, Department of Foods & Nutrition
Poster #6	**Miriam Skiles, Lindsay Jarvis**	Gender and Developmental Differences in Young Children's Autonomy
	Faculty Mentor	Dr. Hui-Chin Hsu, Department of Child & Family Development
Poster #7	**Anne Kimball**	Exercise and Cognition in Overweight Children
	Faculty Mentor	Dr. Jennifer McDowell, Department of Psychology
Poster #8	**Elise Choe**	Social Media Use and Belonging
	Faculty Mentor	Dr. Megan Knowles, Department of Psychology
Poster #9	**David Mitchell, Christina Smith**	Ambient Gender Cue Vigilance in Choosing College Majors
	Faculty Mentor	Dr. Victoria Plaut, Department of Psychology
Poster #10	**Lenae Stansky, Krisztina Varga**	The Development of Directional Understanding in Three- to Five-Year-Old Children
	Faculty Mentor	Dr. Janet Frick, Department of Psychology
Poster #11	**Carla Heyler**	The Effects of Oxytocin on Food Sharing and Cooperation in the Capuchin Monkey (*Cebus apella*)
	Faculty Mentor	Dr. Sarah Brosnan, Department of Psychology
Poster #12	**Rebecca Greenberg**	Decision-Making Strategies of Wild Capuchin Monkey
	Faculty Mentor	Dr. Dorothy Fragaszy, Department of Psychology
Poster #13	**Madison Moore**	Behavioral Changes Following Daily Practice of Saccade Tasks in Schizophrenia
	Faculty Mentor	Dr. Jennifer McDowell, Department of Psychology
Poster #14	**Benjamin Perlow**	The Ideal Religious Experience
	Faculty Mentor	Dr. Leonard Martin, Department of Psychology

Poster #15	**Lauren Doyague, Elizabeth Simpson, Krisztina Varga**	Facial Identity Recognition: Perceptual Narrowing From Infancy Through Adulthood
	Faculty Mentor	Dr. Janet Frick, Department of Psychology
Poster #16	**Jasmine Mathis**	Perceptions About the Implementation of the Georgia Performance Standards in Mathematics
	Faculty Mentor	Dr. Patricia Wilson, Department of Mathematics & Science Education
Poster #17	**Rebecca Roulo**	Natural Prevalence of *Phlebiopsis gigantea* in the Field
	Faculty Mentor	Dr. Sarah Covert, Department of Forest Biotechnology
Poster #18	**Kevin Abney**	Interaction of a Putative Cell-Adhesion Protein from *Anophele gambiae* Larvae Midgut with *Bacillus thuringiensis* Cry 11Ba Endotoxins
	Faculty Mentor	Dr. Michael Adang, Department of Entomology and Department of Biochemistry & Molecular Biology
Poster #19	**Sheena Zhang**	Genetic Effects of Radiation Exposure on *Rana terrestris* Populations from the Chernobyl Exclusion Zone
	Faculty Mentor	Dr. Travis Glenn, Department of Environmental Health Science
Poster #20	**Elizabeth Pollak**	Age-Dependent Susceptibility to *Enterobacter sakazakii* Infection in Neonatal CD-1 Mice
	Faculty Mentor	Dr. Mary Alice Smith, Department of Environmental Health Science
Poster #21	**Akshita Khetarpal, Chris Cornelison, Mopelola Oluwadeire, Puja Bharucha, Zuhha Ashraf, Amyn Lakhani, Hunter Faircloth**	Chicken Pedigree Flocks are the Ultimate Source of *Salmonella* Contaminating Poultry Meat
	Faculty Mentor	Dr. John Maurer, Department of Population Health
Poster #22	**Denise Amoah, Moyo Avize, Gregory Hamilton, Ashley Cornutt, Sima Patel, Nataryana Gowda, Michelle Chua,**	Vertical Transmission of *Salmonella* from Chicken Breeder Birds to Their Progeny Meat Birds Contributes to Most of the Poultry Meat Contamination Observed for *Salmonella*
	Faculty Mentor	Dr. John Maurer, Department of Population Health

Poster #23	**Alexandria Byas**	Determination of the Prevalence of Avian Paramyxovirus-1 in Wintering Populations of Double-Crested Cormorants
	Faculty Mentor	Dr. Kevin Keel, Department of Population Health
Poster #24	**Calley Mersmann**	Thermal Adaptation and Substrate Limitation of Heterotrophic Soil Microorganisms
	Faculty Mentor	Dr. Mark Bradford, Odum School of Ecology
Poster #25	**Sarah Bowden**	West Nile Virus in New York City: Using Birds as an Indicator of Spatio-Temporal Distribution
	Faculty Mentor	Dr. John Drake, Odum School of Ecology
Poster #26	**Melissa Brody**	*Hamelia patens*: A Steady State Resource
	Faculty Mentor	Dr. Ronald Carroll, Odum School of Ecology
Poster #27	**Zach Anderson**	Multicultural Perspectives on Landscape Change
	Faculty Mentor	Dr. Peter Brosius, Department of Anthropology
Poster #28	**Lauren Kelly**	Fibrin Deposition in the Malaria-Infected Placenta: A Disruption in the Balance Between Coagulation and Fibrinolysis
	Faculty Mentor	Dr. Julie Moore, Department of Infectious Diseases
Poster #29	**Jessica Miller**	Determining Genes Required for Virulence in the Opportunistic Intracellular Pathogen *Rhodococcus equi*
	Faculty Mentor	Dr. Mary Hondalus, Department of Infectious Diseases
Poster #30	**Natasha Lee**	The Importance of Specific Genes Within the Cobalamin Region of Mycobacterium Tuberculosis and Their Effect on Virulence
	Faculty Mentor	Dr. Russell Karls, Department of Infectious Diseases
Poster # 31	**Joseph Rimando**	Evaluating the Antibody Response to Respiratory Syncytial Virus (RSV) for the Inhibition of the RSV G Protein Interaction with the CX3C Chemokine Receptor
	Faculty Mentor	Dr. Ralph Tripp, Department of Infectious Diseases
Poster #32	**Stephanie Beavers**	SCCmec-Type Classification of Methicillin-Resistant *Staphylococcus aureus* in Horses
	Faculty Mentor	Dr. Susan Sanchez, Department of Infectious Diseases
Poster #33	**Akanksha Rajeurs**	Development of a System to Create Unmarked Mutations in *Mycobacterium tuberculosis*
	Faculty Mentor	Dr. Russell Karls, Department of Infectious Diseases
Poster #34	**Opeoluwa Fawole**	Studying the Genetic Diversity of the var2csa Gene
	Faculty Mentor	Dr. David Peterson, Department of Infectious Diseases

Poster #35	**Rachel Nix**	The Effects of Fetal Genomic Expression of TNF-aRI and TNF-aRII in *P. chabaudi chabaudi* Complicated Murine Pregnancy
	Faculty Mentor	Dr. Julie Moore, Department of Infectious Diseases
Poster #36	**Lauren Byrd**	Sequencing and Expression of Infectious Bronchitis Virus Nucleocapsid Protein Gene for Use in an Infectious Clone
	Faculty Mentor	Dr. Mark Jackwood, Department of Population Health
Poster #37	**Josh Sumislawski**	The Neurotrophic Action of Botulinum Neurotoxin
	Faculty Mentor	Dr. Julie Coffield, Department of Physiology & Pharmacology
Poster #38	**Kathryn Turner**	Inhibition of LPA Signaling Pathways by RGS Protein Overexpression in Ovarian Cancer Cells
	Faculty Mentor	Dr. Shelley Hooks, Department of Pharmaceutical & Biomedical Sciences
Poster #39	**Logan Davis**	Long-Range Retrograde Neurotrophic Signaling in Mouse Sympathetic Neurons
	Faculty Mentor	Dr. James Franklin, Department of Pharmaceutical & Biomedical Sciences
Poster #40	**Brian Gardner**	Analysis of Pectate Lyase Activity in Pectin-Rich Lignocellulosic Biomass Fermentation
	Faculty Mentor	Dr. Joy Doran-Peterson, Department of Microbiology
Poster #41	**Jennifer Taylor, Poonam R. Patel**	Genetic Duplication and Amplification in the *Acinetobacter baylyi* ADP1 Genome
	Faculty Mentor	Dr. Ellen Neidle, Department of Microbiology
Poster #42	**Shruti Suresh**	Isolation and Identification of Novel Acidobacteria and Verrucomicrobia from Forest Soil
	Faculty Mentor	Dr. William Whitman, Department of Microbiology
Poster #43	**Aalok Sanjanwala**	The Physiological Effects of Hirano Bodies in Neuronal Cells Expressing Mutated Tau
	Faculty Mentor	Dr. Marcus Fechheimer, Department of Cellular Biology and Dr. Ruth Furukawa, Department of Cellular Biology
Poster #44	**Nisha Gupta**	The Role of Hirano Bodies and the Amyloid Precursor Protein in Alzheimer's Disease
	Faculty Mentor	Dr. Marcus Fechheimer, Department of Cellular Biology
Poster #45	**Amina Farooq**	Analysis of the Transcriptional Regulation of Pax6 in the Eye
	Faculty Mentor	Dr. James Lauderdale, Department of Cellular Biology
Poster #46	**Haylee Humes**	How AICD and Fe65 Are Recruited to Hirano Bodies
	Faculty Mentor	Dr. Marcus Fechheimer, Department of Cellular Biology

Poster #47	**Tulsi Patel**	Directed Differentiation of Neural Progenitor Cells into Glial Progenitor Cells
	Faculty Mentor	Dr. Steven Stice, Department of Animal & Dairy Science
Poster #48	**Whitney Boland**	Novel Enzyme
	Faculty Mentor	Dr. Joy Doran-Peterson, Department of Microbiology
Poster #49	**Nirzari Patel**	Comparison of Gnt-V Expression in Different Human Carcinoma Cell Lines
	Faculty Mentor	Dr. Michael Pierce, Department of Biochemistry & Molecular Biology
Poster #50	**Jared McKinnon**	A Physical and Enzymological Characterization of Human Neuron Specific Enolase
	Faculty Mentor	Dr. John Brewer, Department of Biochemistry & Molecular Biology
Poster #51	**Kristen Chicola**	Distinct Processing Activities Are Associated with *Trypanosoma brucei* CaaX Proteases
	Faculty Mentor	Dr. Walter Schmidt, Department of Biochemistry & Molecular Biology
Poster #52	**Jackie Lastra**	Transcription Regulation by the Bacteriophage T4 AsiA Protein: AsiA Interactions with the Beta Subunit of RNA Polymerase
	Faculty Mentor	Dr. Jeffery Urbauer, Department of Chemistry
Poster #53	**Steven Johnson**	Use of Click Chemistry to Assess Glycoprotein Dynamics in Cultured Cells
	Faculty Mentor	Dr. Richard Steet, Department of Biochemistry & Molecular Biology
Poster #54	**Marcus Hines**	Analyzing the Function of O-GlcNAc in the *Drosophila* Nervous System
	Faculty Mentors	Dr. Michael Tiemeyer and Dr. Lance Wells, Department of Biochemistry & Molecular Biology
Poster #55	**John Marshall**	Investigation of the Genetic Basis of Longevity in *Caenorhabtitis elegans* Using DNA Microarray Analysis
	Faculty Mentor	Dr. Lance Wells, Department of Biochemistry & Molecular Biology
Poster #56	**Marissa Ludley**	Comparative Studies on IDE-Activating Compounds
	Faculty Mentor	Dr. Walter Schmidt, Department of Biochemistry & Molecular Biology
Poster #57	**Angela Zachman**	Effect of Microbead Substrates on the Morphology of H945RB.3 Human Neural Progenitor Cells
	Faculty Mentor	Dr. William Kisaalita, Department of Biological & Agricultural Engineering

Poster #58	**Alex Fouraker**	Bipedal Stair Climbing Robots
	Faculty Mentor	Dr. Chi Thai, Department of Biological & Agricultural Engineering
Poster #59	**Neeraj Sriram**	Exclusive Consumption of Sugars as a Biological Means to Convert Lignocellulosic Hydrolysates Effectively
	Faculty Mentor	Dr. Mark Eiteman, Department of Biological & Agricultural Engineering
Poster #60	**Aileen Thomas**	Human Random Capacities Through Repeated Numeric Sampling
	Faculty Mentor	Dr. Nicole Lazar, Department of Statistics
Poster #61	**Whitney Ingram**	The Effect of Titanium Dioxide Surface Area on Its Photocatalytic Activity
	Faculty Mentor	Dr. Yiping Zhao, Department of Physics & Astronomy
Poster# 62	**Hunter Wilson**	8-Chloro-7-hydroxyquinoline and Xanthone Acetic Acid Derivatives as Photoremovable-Protecting Groups with Susceptibility to Two-Photon Excitation
	Faculty Mentor	Dr. Timothy Dore, Department of Chemistry

6:15 – 8:00 p.m. Art Gallery Talks

Classic Center, Fire Hall

Introductions	Professor Georgia Strange, Director, Lamar Dodd School of Art Mr. Mark Callahan, Artistic Director, Ideas for Creative Exploration

Visual Arts Presenters

Talia Bromstad	*In The Field*: Understanding Science Through The Book Arts
Faculty Mentor	Prof. Amanda Burk, Department of Printmaking
Jordan Dalton	*Meat Out of the Eater*
Faculty Mentor	Mr. Mark Callahan, Artistic Director, Ideas for Creative Exploration
Brittany Norman	Art & Engineering: A Binocular Vision
Faculty Mentor	Prof. Martijn van Wagtendonk, Department of Studio Foundations
Malorie McCloy	*Altered Surfaces*: Fabric Manipulation and Design
Faculty Mentor	Prof. Clay McLaurin, Department of Fabric Design
Ash Sechler	*Borrowed Building/Search Cycle*
Faculty Mentor	Mr. Mark Callahan, Artistic Director, Ideas for Creative Exploration
Daisy Whelan	*Weaving the Fog*
Faculty Mentor	Prof. Clay McLaurin, Department of Fabric Design

Marilyn Zapf	Jewelry in the Age of Postmodernism
Faculty Mentor	Dr. Mary Pearse, Department of Jewelry & Metalworking

Art exhibit arranged by Mr. Jeffrey Whittle, Gallery Director, Lamar Dodd School of Art

8:00 p.m. Dessert Reception & Awards Ceremony

Classic Center, Fire Hall

Presentation of CURO Summer Research Fellows, CURO Scholars, UGA Libraries Undergraduate Research Awards, and Best Paper Awards	Dr. David S. Williams, Director, Honors Program Ms. Florence E. King, Assistant University Librarian for Human and Director, Miller Learning Center Ms. Deborah Dietzler, Executive Director, UGA Alumni Association

The office of the Senior Vice President for Academic Affairs and Provost and the Honors Program established the Excellence in Undergraduate Research Mentoring Award in 2001. This award recognizes faculty, departments, and programs devoted to outstanding research mentorship of undergraduate students. Awards will be presented at the CURO Symposium Awards Ceremony on Monday, April 6, 2009 at 4:00 p.m. in the Classic Center, Athena Ballroom E.

2009 Awards

Early Career Faculty Award
Dr. Brian S. Cummings, Assistant Professor of Pharmaceutical & Biomedical Sciences
Dr. Anna C. Karls, Associate Professor of Microbiology
Dr. Dawn T. Robinson, Associate Professor of Sociology

2008 Awards

Master Level Faculty Award
Dr. John J. Maurer, Professor of Population Health
Early Career Faculty Award
Dr. Walter K. Schmidt, Assistant Professor of Biochemistry & Molecular Biology
Program Award
Biomedical and Health Sciences Institute

2007 Awards

Master Level Faculty Award
Dr. Timothy Hoover, Associate Professor of Microbiology
Early Career Faculty Award
Dr. Steven Stice, Professor of Animal & Dairy Science

2006 Awards

Master Level Faculty Award
Dr. Patricia Hunt-Hurst, Associate Professor of Textiles, Merchandising & Interiors
Early Career Faculty Award
Dr. Rodney Mauricio, Professor of Genetics
Graduate Student Award
Christopher Anderson, PhD candidate in Ecology
Graduate Student Recognition
Dawn Holligan, PhD student in Plant Biology

2005 Awards

Faculty Awards
Dr. Gary Barrett, Odum Professor of Ecology
Dr. Sidney Kushner, Professor of Genetics
Department Award
Department of Cellular Biology

2004 Award

Faculty Award
Dr. William S. Kisaalita, Associate Professor of Biological & Agricultural Engineering

2003 Awards

Faculty Award
Dr. Jody Clay-Warner, Assistant Professor of Sociology
Department Award
Department of Microbiology
Dr. Duncan Krause, Department Head
Dr. Timothy Hoover, Undergraduate Coordinator
Program Award
The Pratt Laboratory of Plant Genomics and Bioinformatics
Dr. Lee H. Pratt, Professor
Dr. Marie-Michèle Cordonnier-Pratt, Senior Research Scientist

2002 Awards

Faculty Awards
Professor William D. Paul, Jr., Professor of Art
Dr. Katherine Kipp, Associate Professor of Psychology
Faculty Recognition
Dr. Susan Sanchez, Assistant Professor of Veterinary Medicine
Department Award
Department of Biochemistry & Molecular Biology
Dr. J. David Puett, Department Head
Program Award
"Physics Beyond the Boundaries": National Science Foundation, REU Program
Dr. Loris Magnani, Principal Investigator, Professor of Physics and Astronomy
Dr. Heinz-Bernd Schuttler, Professor and Department Head of Physics and Astronomy
Dr. Jonathan Arnold, Professor of Genetics
Dr. Susmita Datta, Professor, Georgia State University
Dr. David Logan, Professor, Clark Atlanta University
Dr. William Steffans, Professor, Clark Atlanta University

2001 Awards

Faculty Award
Dr. Marcus Fechheimer, Professor of Cellular Biology

Faculty Recognition
Dr. David MacIntosh, Associate Professor of Environmental Health Sciences
Dr. Dean Rojek, Associate Professor of Sociology

Department Award
Genetics Department
Dr. John MacDonald, Department Head and Professor

Program Award
Savannah River Ecology Laboratory
Dr. Paul Bertsch, Director

Graduate Student Reviewers for CURO 2009 Symposium

William Abney	Comparative Literature
Ashley Barr	Sociology
Rebecca Cheney	Adult Education, Gerontology
Sarah Craven	Microbiology
Patti Davis	Social Psychology
Jim Gigantino	History
Stephanie Hazel	Higher Education
Erik Jacobson	Math Education
Lisa Kanizay	Plant Biology
Tyler Kartzinel	Ecology
Anna McKee	Forestry & Natural Resources
Sharon O'Kelley	Math Education
Aaron Petrey	Biochemistry & Molecular Biology
Natalie Pope	Social Work
David Porcaro	Educational Psychology, Instructional Technology
Sarah Reiff	Cellular Biology
Katherine Robbins	Food Science
Laura Singletary	Math Education
Gaston "Chip" Small	Ecology
Shannon Whitlock	English

Faculty Reviewers for Best Paper Awards

Dr. Harry Dailey	Professor, Biochemistry & Molecular Biology, Microbiology Director, Biomedical and Health Sciences Institute
Dr. Margaret E. Holt	Professor Emerita, Adult Education
Dr. Sylvia Hutchinson	Professor Emerita, Higher Education, Reading Education and Coordinator, Emeriti Scholars
Dr. Douglas A. Kleiber	Professor, Counseling Psychology
Dr. Richard Siegesmund	Professor, Art Education
Dr. Frances Teague	Professor, English
Dr. Kalpen Trivedi	Director, UGA at Oxford Study Abroad Program

Graduate Student Reviewers for Best Paper Awards

Will Abney	Comparative Literature
Patti Davis	Social Psychology
Stephanie Hazel	Higher Education
Tyler Kartzinel	Ecology
Anna McKee	Forestry & Natural Resources
Sharon O'Kelley	Math Education
David Porcaro	Educational Psychology, Instructional Technology
Sarah Reiff	Cellular Biology
Laura Singletary	Math
Shannon Whitlock	English

Reviewers for Excellence in Undergraduate Research Mentoring Awards

Dr. Jerry Legge	Professor and Associate Dean, School of Public & International Affairs
Dr. Timothy R. Hoover	Associate Professor and Associate Department Head, Microbiology, Franklin College of Arts & Sciences
Dr. Patricia Hunt-Hurst	Professor and Department Head, Textiles, Merchandising & Interiors, College of Family & Consumer Sciences
Dr. Sidney Kushner	Distinguished Research Professor, Genetics, Franklin College of Arts & Sciences
Dr. Susan Sanchez	Associate Professor, Infectious Diseases, College of Veterinary Medicine
Dr. Walter Schmidt	Assistant Professor, Biochemistry and Molecular Biology, Franklin College of Arts & Sciences
Dr. Steven Stice	Georgia Eminent Scholar and Professor, Animal & Dairy Science, College of Agricultural & Environmental Sciences

Reviewers for CURO Summer Research Fellowships

Dr. Wyatt Anderson	Alumni Foundation Distinguished Research Professor, Genetics
Dr. E. M. Beck	Meigs Professor, Sociology
Dr. Katarzyna Jerzak	Associate Professor, Comparative Literature
Dr. Michael Roden	Professor and Department Head, Geology
Dr. Regina Smith	Associate Vice President, Office of Vice President for Research
Dr. Frances Teague	Meigs Professor, English
Dr. Juergen Weigel	Professor, Microbiology

CURO Advisory Board

Dr. Wyatt Anderson	Alumni Foundation Distinguished Professor, Genetics
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Dr. Steven Stice	Georgia Eminent Scholar and Professor, Animal & Dairy Science
Dr. Kecia Thomas	Professor, Psychology and Senior Advisor to the Dean of Franklin College of Arts & Sciences
Dr. Katharina Wilson	Professor, Comparative Literature
Ms. Adele Handy	Undergraduate Student
Ms. Courtney Thomas	Undergraduate Student
Ms. Tulsi Patel	Undergraduate Student

Ex Officio

Dr. David S. Williams	Director, Honors Program
Dr. Pamela B. Kleiber	Associate Director, Honors Program

2008-09 CURO Gateway Seminar Faculty

Dr. William Kretzschmar	Professor, English, Linguistics
Dr. E. M. Beck	Professor, Sociology
Dr. Marcus Fechheimer	Professor, Cellular Biology
Mr. Mark Callahan	Artistic Director, Ideas for Creative Exploration
Dr. Katarzyna Jerzak	Associate Professor, Comparative Literature
Dr. Paul A. Schroeder	Professor, Geology
Dr. John Maerz	Assistant Professor, Forestry & Natural Resources
Dr. Susan Sanchez	Associate Professor, Infectious Diseases

Thesis Roundtable Conveners

Dr. William Flatt	D. W. Brooks Distinguished Professor Emeritus, Foods & Nutrition and Emeriti Scholar
Ms. Jessica Hunt	Major Scholarships Coordinator, Honors Program
Dr. Sylvia Hutchinson	Professor Emerita, Higher Education, Reading Education and Coordinator, Emeriti Scholars
Mr. Matt Jordan	Administrative Associate, Honors Program
Dr. Pamela B. Kleiber	Associate Director, Honors Program
Dr. M. Louise McBee	Dean of Women Emerita and Emeriti Scholar
Ms. Maria de Rocher	Program Coordinator, Honors Program
Mr. Martin Rogers	Coordinator of Courses & Advising, Honors Program
Dr. Ronald D. Simpson	Professor Emeritus, Higher Education and Emeriti Scholar

Interaction of a Putative Cell-Adhesion Protein from *Anopheles gambiae* Larvae Midgut with *Bacillus thuringiensis* Cry 11Ba Endotoxins

Kevin Abney
Dr. Mike Adang, Department of Entomology and Department of Biochemistry & Molecular Biology, University of Georgia

Mosquitoes in the genus *Anopheles* vector malaria, a devastating disease, especially in Africa. This research investigated a protein in the gut of mosquito larvae that is a key to understanding how an insecticidal protein of *Bacillus thuringiensis* (*Bt*) kills mosquito larvae. With this information we may be able to make *Bt* more effective in controlling mosquitoes. The protein I am investigating is called AgPCAP for *Anopheles gambiae* putative cell-adhesion protein. AgPCAP is a member of a protein family called cadherins. To investigate interactions between AgPCAP and *Bt* Cry 11Ba, the cDNA encoding PCAP protein was divided into parts called CR 14-MPED and TM-CYTO and these protein parts were expressed in the bacterium *Escherichia coli*. The CR 14-MPED protein was found to bind to the *B. thuringiensis* Cry 11Ba toxin with high affinity, while the PCAP TM-Cyto fragment showed no specific binding. Bioassays have also shown that CR 14-MPED inhibited Cry 11Ba toxicity against the 4th instar *A. gambiae* larvae. These results, along with ability of the CR-14 MPED fragment to bind to vesicles in the midgut (BBMV) of larval *A. gambiae*, are evidence that the CR 14-MPED region of PCAP has a strong attraction to the toxin and that the PCAP protein is probably a receptor for the *Bt* toxin in *A. gambiae* larvae. This information will be helpful in designing novel *Bt* proteins for mosquito control.

Answering the Call for Equity, Relevance, and Inclusion: Rethinking the Role of the Disciplinary Alternative Education in the Savannah-Chatham County Public School System

Jeremy Akin – Roosevelt@UGA
Dr. Larry Nackerud, School of Social Work, University of Georgia

In light of the Savannah-Chatham County Public School System's mission statement, "From school to the world: *All* students prepared for productive futures," questions as to the thoroughness and equity with which support is shown to students enrolled in its disciplinary alternative education program must be addressed. The Scott Alternative Learning Center-the system's only disciplinary alternative school-faces increasing difficulty in its ability to sustainably provide its students with a quality education and atmosphere for behavioral growth due to (and evidenced by) problems associated with dramatic system-wide increases in punitive referrals, rapid program overcrowding, high truancy rates, and top levels of juvenile prison placements. In addition, the school system's recent adoption of zero-tolerance discipline policies, which suspend or expel students for misbehavior that would have previously merited less severe repercussions, reveals further grounds for concern. From a careful review of the literature, on-site visits, and analysis of official school system records, this policy proposal details specific reforms which employ existing institutions and city partnerships for the benefit of both students at the Scott Center and the wider Savannah community. Best practices of similar disciplinary alternative schools are also considered in a Savannah-appropriate context. Such revitalized investment in the lives of students at the Scott Center will positively impact system accountability, levels of juvenile delinquency, graduation rates, and the quality of Savannah's local workforce.

Cloning and Expression of a *Burkholderia pseudomallei* DNA Fragment Specifying an Adherence Factor

Christine Akoh – CURO Apprentice
Dr. Eric Lafontaine, Department of Infectious Diseases, University of Georgia

Burkholderia pseudomallei (*Bp*) is a Gram-negative bacterium which causes the infectious disease melioidosis in humans. *Bp* is endemic to parts of Southeast Asia and Northern Australia and can be readily isolated from wet soils. Melioidosis is difficult to diagnose and *Bp* is intrinsically resistant to most antibiotics

complicating treatment considerably. The infectious dose of *Bp* is not known, but experiments with various animal models have demonstrated that the lethal dose is very low. For these reasons, the organism has been classified as a Category B Select Agent of bioterrorism, and there is an urgent need to develop a vaccine to protect against *Bp*. Previous studies by our laboratory suggest that multiple proteins of *Bp* mediate adherence to respiratory epithelial cells. Adherence is a crucial step in pathogenesis by most infectious agents because it leads to colonization. The purpose of our research is to evaluate the vaccinogenic potential of *Bp* adherence proteins. My research project focuses on one adherence factor designated BoaC. A DNA fragment specifying a large portion of BoaC was amplified from the genome of *Bp* strain 1026b. We are currently trying to clone this PCR product into the Hind III and Pac I sites of the plasmid pETcoco-1. Preliminary experiments indicated that the cloning was unsuccessful. Once we successfully clone the BoaC fragment in pETcoco-1, we will purify the recombinant protein (via a six histidine affinity tag) and test its immunogenicity in mice. This work will further our goal of developing potential vaccine candidates to protect against *Bp*.

Vertical Transmission of *Salmonella* from Chicken Breeder Birds to Their Progeny Meat Birds Contributes to Most of the Poultry Meat Contamination Observed for *Salmonella*

Denise Amoah, Moyo Avize, Gregory Hamilton, Ashley Cornutt, Sima Patel, Nataryana Gowda and Michelle Chua
Dr. John Maurer, Department of Population Health, University of Georgia

Salmonella is one of the leading causes for food illnesses in the world. Poultry meat and eggs have been implicated in many foodborne outbreaks. Within poultry companies, *Salmonella* can be spread to consumable, meat birds either through horizontal, direct, or indirect contact with contaminated environment, or vertical transmission, where *Salmonella* is transmitted from the parent breeder birds to their progeny meat birds. We believe that vertical transmission in poultry companies contributes to most of the *Salmonella* contamination of poultry meat. *Salmonella* was isolated from pullet chicken farms (reproductively, immature breeder birds), broiler-breeder chicken farms (reproductive breeder birds), and broiler chicken (meat birds) farms, which included the environment, the hens and broiler chickens themselves. We used pulsed field gel electrophoresis (PFGE) in this study to tie the *Salmonella* isolated from the chicken carcass back to the broiler, broiler-breeder farm, or pullet farms. PFGE is the standardized protocol used by the CDC to identify outbreaks by matching bacterial DNA fingerprints. Our results indicate that *Salmonella* strains from chicken carcasses matched with *Salmonella* isolated from the pullet or broiler-breeder farms. However, we also observed matches only between chicken carcasses and broiler farms. Based on the evidence presented, we observed both vertical and horizontal transmission of *Salmonella* within a poultry company. To reduce chicken carcass contamination of *Salmonella* will require some intervention strategy applied at both the broiler-breeder and broiler level.

Multicultural Perspectives on Landscape Change

Zach Anderson – CURO Summer Fellow
Dr. J. Peter Brosius, Department of Anthropology, University of Georgia

The ecological and cultural landscapes in which each of us lives shape our personal identity and sense of place. As these landscapes change over time, our sense of identity and place are also changed. This research was undertaken as a multi-sited, non-structured case study of traditional villages in Fiji and Brazil. Both study areas have seen dramatic landscape changes over recent decades. The goal of this research was to document changes in the way that residents think about themselves and their land. In addition to non-structured interviews and community interaction, I conducted a review of research in both study areas. In both areas there has been work done by community members to create community-based conservation

organizations designed to protect both the local environment and traditional culture. These groups, specifically the Waitabu Marine Park in Fiji and the Projecto Saude e Alegria in Brazil, have been relatively successful at their goals by allowing local people to seek alternative means of income while maintaining traditional ways of life and preserving landscapes; however, the impact they have had on community members' sense of place and connectedness to their landscape has differed. This study is valuable to global conservation because it explores the factors that influence people's connectedness with their landscape. In studying these factors, the goals are to understand why locally managed conservation works well in some areas but not in others and to use this knowledge to improve the design of conservation projects in the future.

SCCmec-Type Classification of Methicillin-Resistant *Staphylococcus aureus* in Horses

Stephanie Beavers
Dr. Susan Sanchez, Department of Infectious Diseases, University of Georgia

Staphylococcus aureus, a ubiquitous, gram-positive bacterium, colonizes the skin of many species, generally without causing infection; methicillin-resistant *Staphylococcus aureus* (MRSA), however, can cause severe infections in both humans and animals. The mecA gene, located on the staphylococcal chromosomal cassette (SCC*mec*) of *S. aureus*, encodes for resistance to beta-lactam antibiotics and has become increasingly prevalent in *Staphylococcus* species in recent years. From 1995 to 2003, when MRSA, particularly SCC*mec* type IV, was emerging as a community-acquired pathogen in humans in the United States, 167 equine isolates of *S. aureus* from various infection sites were collected in Georgia and Kentucky. As horses often live in close contact with humans, the emergence of *SCCmec* types in equine MRSA infections may reflect similar trends as those observed in humans; thus, polymerase chain reaction (PCR) analysis was performed on these samples to investigate possible correlations between the rising numbers of equine and human MRSA infections. Seventy samples tested positive for the mecA gene and were then classified by SCC*mec* type. The resulting data suggest that SCC*mec* type IVd has predominated in the equine populations of both Kentucky and Georgia for several years. As suspected, the emergence of SCC*mec* type IVd MRSA in the equine population between 1995 and 2003 appears to closely mirror the increasing prevalence of SCC*mec* type IV observed in humans. These findings hold important implications for veterinarians and may provide valuable insight for the study of zoonotic transmission of MRSA to the individuals who work and live closely with these animals.

Determinants in the Localization of Telomerase to Telomeres

Matthew Belcher – CURO Summer Fellow
Dr. Michael Terns, Department of Biochemistry & Molecular Biology, University of Georgia

Due to the unidirectional nature of DNA polymerase, linear eukaryotic chromosomes become shorter with each round of DNA replication and cell division. This shortening is counteracted by telomerase, which when activated can confer an unlimited capacity for cell division. While telomerase is not active in most human somatic cells, it is activated in over 90% of cancers, immortalizing the cells. In cancer cells, we have found that the activity of telomerase is restricted to S phase of the cell cycle through regulated trafficking of two telomerase components, human Telomerase RNA (hTR) and human Telomerase Reverse Transcriptase (hTERT).[1] To better understand the recruitment of telomerase to telomeres, I observed the localization of the two components of telomerase in cells expressing specific mutants of the protein component hTERT. I did this by transfecting telomerase positive human cervical cancer cells with the TERT mutants along with the second telomerase component, hTR. We then labeled the hTR, hTERT, and telomeres with fluorescent markers and examined them using fluorescence microscopy and compared to cells transfected with wild type hTERT and hTR. The telomerase components in the cells transfected with mutants displayed localization phenotypes different from the wild

type cells, suggesting that the mutated regions of the hTERT protein are important for the localization of the telomerase components to each other and to their site of action, the telomeres.

[1] Tomlinson, R.L., Ziegler, T.D., Supakorndej, T., Terns, R.M., and Terns, M.P. (2005) Cell cycle regulated trafficking of human telomerase to telomeres. *Molecular Biology of the Cell*, 17(2):955-65.

Modeling HLHS: Living with Half a Heart

Robert Bennett
Dr. William Kisaalita, Department of Biological & Agricultural Engineering, University of Georgia

Hypoplastic Left Heart Syndrome (HLHS) is a mutation resulting in the underdevelopment of the left side of the heart, including the aorta, aortic valve, left ventricle and mitral valve, leaving it unable to circulate blood effectively. Newborns may show no symptoms at first, but will soon have serious medical problems when the ductus arteriosus closes, with death ensuing if no treatment is available. However, HLHS can be treated effectively by a series of palliative surgeries, the first of which is an operation to put in place a right ventricle-pulmonary artery (RV-PA) shunt, known as the Norwood procedure, and the last of which being a total cavopulmonary connection, known as a Fontan operation. Currently, there are not any working models of a HLHS heart or of a heart in any phase of recovery. Therefore, the purpose of this study was to create a working computer model for the atrial pressures of a normal heart, a HLHS heart, and a heart in various phases of recovery. The model is an extension of the 1997 Hannon and Ruth STELLA heart model. A key feature of our model is the incorporation of the Hogkin-Huxley action potential model to control the heart beat. With our model, physicians and scientists can better understand the conditions of HLHS, enabling the creation of better treatment.

Novel Enzyme

Whitney Boland
Dr. Joy Doran-Peterson, Department of Microbiology, University of Georgia

Paenibacillus amylolyticus C27 was isolated from the hindgut of *Tipula abdominalis* and found to produce lignocellulose-degrading enzymes. A library was constructed with C27 genomic DNA for heterologous expression of biological characteristics in *Escherichia coli* to identify genes encoding pectinases, xylanases, and cellulases. Pel B, the gene discovered, encodes a 392 amino acid protein which is a novel pectinase. Pel B is an unusual pectate lyase that is able to breakdown highly methylated pectin, as well as polygalacturonate. Although Pel B showed the most activity on polygalacturonic acid, it was still able to obtain 26% and 3.5% of its maximum activity on 8.50% and 90% methylated pectin, respectively. The optima were pH 9.5, 55°C, and 0.5 mM CaCl2, and CaCl2 was required for the enzymatic activity. Pel B is a subclass of the pectate lyase family 1 and shows no significant similarity to any known enzyme. It shows highest identity of only 27% to pectate lyase of *Thermotoga maritime* MSB8. The degradation of pectin-rich sugar beet pulp by Pel B was demonstrated by measuring the number of small chain oligogalacturonides. In order to investigate the use of Pel B in lignocellulose fermentations, *E. coli* strain JP29 was constructed using ethanologen *E. coil* LY40A expressing Pel B on a plasmid, and the production of ethanol will be quantified to demonstrate the use of Pel B in lignocellulose biomass conversion to ethanol fuel.

West Nile Virus in New York City: Using Birds as an Indicator of Spatio-Temporal Distribution

Sarah Bowden
Dr. John Drake, Odum School of Ecology, University of Georgia

West Nile Virus (WNV) first appeared in the United States in New York City in 1999 and has since then spread to almost every contiguous state. WNV has become endemic in the city of New York and continues to pose a health threat to the area. This project uses the distribution of WNV sero-positive dead birds to determine 1) what landcover types are positively or negatively associated with WNV positive bird

distribution, 2) which environmental covariates, such as temperature, rainfall, and elevation, significantly influence the distribution of WNV positive birds, and 3) what combination of these factors can be used to form an early warning system for WNV outbreaks in New York City. The landcover analysis was performed using a Chi-squared test comparing each of 11 landcover types. We found that significantly more WNV positive birds were reported in low-intensity developed areas and wetlands than were expected, and significantly less were reported in high-intensity developed areas than were expected. The covariate analysis will involve the use of boosted regression trees, which will show the relative influence of each environmental factor on the spatio-temporal distribution of WNV positive birds. These analyses will allow us to combine significant spatial and temporal covariates to provide an early warning system for New York City based on when and where outbreaks have occurred in previous years. Such a system would not only help prevent human infection in New York City, but could also be applied to other highly urbanized areas in the United States.

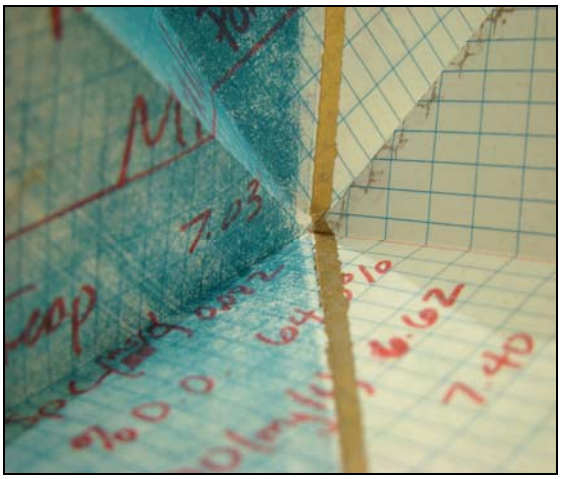
***Hamelia patens*: A Steady State Resource**

Melissa Brody – CURO Summer Fellow
Dr. Ronald Carroll, Odum School of Ecology, University of Georgia

Hamelia patens, a steady state floral resource, is found interspersed within sustainable shade-grown coffee (*Coffea arabica*) farms. Due to *H. patens'* continuous flower production, it has the potential to play a crucial role in the biodiversity conservation of its pollinators, predominantly native bees and hummingbirds. Most of these bees also use nectar and pollen from coffee flowers, but due to short-lived coffee flower production, the constant availability of *H. patens* floral resources may be important for maintaining these pollinators within coffee plantations. To investigate the impact of a steady state floral resource on pollinator communities, bee and hummingbird abundance and species richness indices were tracked on two types of farms, some with a rich resource patch of *H. patens* (10+ individuals) and some without a rich resource patch of *H. patens* (1 individual). Previous research suggests that farms with rich resource patches of *H. patens* will have greater diversity and abundance of pollinators than on farms without *H. patens.* In San Luis de Monteverde, Costa Rica, mobile potted basil plants and hummingbird feeders were used to evaluate differences in the abundance and species richness of bees and hummingbirds on these two types of farms. In concordance to my predictions, results show that both bee abundance and diversity were greater on farms with *H. patens.* However, hummingbird abundance was greater on farms without *H. patens* and there was no difference in hummingbird diversity between the two farms. This result may differ from our predictions because large foraging ranges, such as those of hummingbirds, may be resistant to temporally stable resources. Because *H. patens* does have a positive impact on bee pollinator communities, steady state floral resources can be useful for crop production, land management practices, and biodiversity conservation.

***In The Field*: Understanding Science Through The Book Arts**

Talia Bromstad
Prof. Amanda Burk, Department of Printmaking, University of Georgia



The work I find most fascinating is that of scientists, as it tends to remain a large mystery to me, a student of the fine arts. I recognize the importance of what these people learn and do, but I know that, ultimately, it is a field I will

never completely understand. It is with this in mind that I am exploring the idea of creating artwork that begins with the tools and artifacts of the world of science. More specifically, I am taking the field and lab books of students and professors of science and deconstructing them, reducing them to their basic parts. The calculations and notations within the books were once essential and significant—albeit cryptic to me—but without their bindings and order their meaning is erased, thus reducing them to their inherent visual structure. I am interested in how the physical remnants of the mental process become an abstract field of mark-making, and it is this field that I respond to, reworking and building upon it until I have reconstructed the journal in a new fashion that combines the mystery of the science with my attempts to understand it. The finished product is also a field book, but it is completely transformed; choices were made based upon visual aesthetics rather than facts and practicality. Throughout the process, I am reminded of the impact science has on how we perceive the world around us, but also of the impact art has on how we understand that science.

Watershed Land Use Effects on Carbon Processing in Streams

Reid Brown and Jessica Sterling
Dr. Amy Rosemond, Odum School of Ecology, University of Georgia

Detrital carbon in the form of dead leaves and wood is a significant food resource in aquatic ecosystems. Breakdown, or processing, of carbon affects energy flow to higher trophic levels. Land use changes such as urbanization result in increased runoff of nutrients and toxicants to streams, as well as alter hydrology and increase temperatures, which can affect microbial processing of carbon. The effects of urbanization on carbon processing (+ or -) have been mixed in other studies, as overriding factors may be land-use specific. Our study tested whether carbon processing rates were different among streams that differed in watershed urbanization. We measured breakdown and associated microbial respiration rates across an urban land use gradient. Eleven sites were chosen on six streams in Clarke County, Georgia, USA. Sites were classified as urban, suburban, industrial, or forested based on surrounding land use and impervious surface cover. Strips of white oak (*Quercus alba*) veneer were fixed to the streambed at each site. Veneers were collected at 50, 95 and 160 days after deployment. At each collection, rates of microbial respiration and ash-free dry mass (AFDM) were measured to quantify microbial activity and wood breakdown rates. Data will be analyzed using ANCOVA with temperature as a covariate. Initial results indicate that microbial respiration and breakdown rates are greatest at the suburban sites. Since rates of breakdown and respiration indicate the rate at which carbon is transformed, mobilized, and made available to other organisms, our results suggest that watershed urbanization affects important ecosystem functions in streams.

Validity of English

Corbin Busby and Shelby Jones
Dr. Sujata Iyengar, Department of English, University of Georgia

As an undergraduate major, English literature is relatively new. As the "vernacular," the English language and literature written in it has suffered historically from comparison with classical literature; not until the late nineteenth century did universities begin to consider English literature a subject worthy of academic study, and even today critics on both the right and left of the political spectrum question its value within the university (e.g., Gerald Graff, *Professing Literature*; Michael Bérubé, *What's Liberal about the Liberal Arts*). On the one hand, English departments across the United States have inherited the responsibility of cultivating individuals who will become responsible citizens, citizens who will then represent the opinions, ideas, or thoughts of their education and who will spread this cultural development throughout their communities, states, and nation. On the other hand, such results are intangible, unquantifiable, and only elliptically lucrative. Writer-scholars such as Matthew Arnold, Percy Shelley, and David Lodge have, in the past, defended the role of

literature and the arts in society and students' exposure to the canon of art and culture. But because of recent national budget cuts, universities have been pressured to decide which departments to cut, and right-wing critics have challenged the English department specifically concerning "queer theory" and "feminism." An argument to defend these areas of criticism, specifically from two English students' points of view, is therefore necessary. Many defenders of literature describe a future in which the creators of art and their empathizers are uniquely able to understand how to interact with and interpret society. As Bérubé argues, modern English education requires an understanding of the minority (because of literature's capacity to make us empathize with other minds), and our study traces the variety of efforts and pressures that pit this understanding against traditional conceptions of the canon of literature. Our paper reminds us that a cohesive population depends upon opposing voices. Our study therefore emphasizes literature that celebrates the culture and life of a variety of minority groups and the ability of the story to forge relationships. We will argue that English literature's ability to suggest various meanings to life and concentrate upon the interactions between people rises above the discrimination it receives within the academic world. This attribute, what the poet John Keats called "negative capability," is what makes the study of English literature essential and valid as an option for all undergraduates.

Determination of the Prevalence of Avian Paramyxovirus-1 in Wintering Populations of Double-Crested Cormorants

Alexandria Byas
Dr. Kevin Keel, Department of Population Health, University of Georgia

Virulent Newcastle disease (VND), caused by certain strains of avian paramyxovirus serotype-1 (APMV-1), has resulted in significant mortality among breeding populations of double-crested cormorants (*Phalacrocorax auritus*). Strains of virus causing VND are actively excluded from domestic poultry due to the severe economic impacts. Virulent strains have been isolated from cormorants wintering in Savannah, Georgia, in contradiction to negative results produced by a survey of cormorants from Alabama, Florida, and Mississippi. The goals of this research are to further expand the surveillance of cormorants for APMV-1 and to compare any isolates obtained to those previously described. It is hypothesized that the prevalence of APMV-1 carriers among wintering cormorants will vary proportional to the severity of outbreaks in the previous summer. Viruses will be isolated by inoculating embryonated chicken eggs with cloacal swabs from cormorants. Hemagglutinating activity assays will be used to quantify the presence of the virus, and isolated viruses will be identified using polymerase chain reaction assays with sequencing of the products. These methods amplify the virus, giving this approach higher sensitivity than the previous study. Higher sensitivity to the virus is expected to increase the ability to yield positive results. Environmental samples of voided feces have been collected from the Savannah site. Additional samples will include cloacal swabs from cormorants actively collected for this project, cormorants killed through depredation permits, and voided feces. As carriers of APMV-1, cormorants potentially serve as a source of virus transmission to domesticated poultry flocks with the possibility of major economic consequences.

Sequencing and Expression of Infectious Bronchitis Virus Nucleocapsid Protein Gene for Use in an Infectious Clone

Lauren Byrd
Dr. Mark Jackwood, Department of Population Health, University of Georgia

This project coincides with a larger goal of developing a viral infectious clone for infectious bronchitis virus (IBV) a coronavirus that causes a highly infectious upper-respiratory disease in commercial chickens. An infectious clone is used to recreate infectious virus using nucleic acids in the laboratory. Infectious clones are easily manipulated and thus are useful in the study of viral processes and infection. The purpose of this research is to clone and verify the genetic sequence of the nucleocapsid gene of

IBV and to express that protein in cell culture. The nucleocapsid protein is necessary to protect the viral RNA obtained from the infectious clone so that the virus can be regenerated. The methods outlined below were designed to successfully generate the nucleocapsid protein for use in rescuing the IBV infectious clone. Reverse transcriptase polymerase chain reaction (RT-PCR) is a method for synthesizing and generating (amplifying) many copies of DNA from an RNA template. The nucleocapsid gene from the Mass 41 strain of IBV was amplified using RT-PCR, inserted into a bacterial plasmid (TOPO vector), and transformed into *Escherichia coli* cells. The nucleocapsid gene in the TOPO vector was sequenced using specifically designed primers to verify the integrity and orientation of the gene within the plasmid, which is important for subsequent expression of the nucleocapsid protein. A continuous cell line (293T cells) will be used to express the nucleocapsid protein in the laboratory. An immunofluorescent assay using antibodies directed against the nucleocapsid protein will verify protein expression in the cells. Successful expression of the nucleocapsid protein is the first step in regenerating IBV from an infectious clone.

Changes in Cooking and Eating Practices of Griffin, Georgia

Kelli Canterbury – CURO Apprentice
Dr. William Kretzschmar, Jr., Department of English, University of Georgia

As Southern culture undergoes change due to urbanization, it is important to note the differences between aspects of today's Southern lifestyle and the older traditions and customs. The Linguistic Atlas Program provides linguistic data from all areas of the United States, with interviews that contain cultural information concerning practices of Americans from the late nineteenth century through the late twentieth century. In the interest of time, I have narrowed my focus to the cooking and eating practices of Griffin, Georgia, a Southern mill town that is beginning to move from a rigid social structure containing mainly mill villagers and farmers to a structure that contains more commuter workers and townspeople. To provide modern perspective, approximately eight current Griffin residents are interviewed and tape-recorded about their culinary habits. Then the data are compared to the Atlas Project's Griffin, GA interviews from the 1970s. These residents are between the ages of 35 and 80 so that they may attest to changes that have occurred in diet over time, as well as provide personal accounts of how changes in the social structure of Griffin have affected their culinary habits.

Dispersion of Carbon Nanotubes in Aqueous Solution

Meagan Cauble
Dr. Marcus Lay, Department of Chemistry, University of Georgia

The protozoan parasite, *Ophroycystis elektroscirrha*, infects monarch butterflies (*Danaus plexippus*). Parasite infection reduces fitness and longevity in monarch butterfly hosts, with higher parasite loads resulting in shorter host life spans. Because high infection levels (i.e., high parasite density) cause high virulence within the host, we tested if high infection loads are also advantageous to the parasite through increased transmission. Monarch larvae were infected with various doses of parasites and reared to adulthood, and parasite spores on milkweed leaves and eggs were counted. Results showed that heavily infected monarchs transmitted more spores onto leaves and eggs than lightly infected monarchs. When females laid eggs, they also transmitted more spores onto leaves than when they did not lay eggs. Spore counts taken from two dates did not significantly differ, suggesting that once a host is infected, the parasite can be transmitted over a certain time interval without decreasing in number. These results suggest that parasites require a high level of infection to transmit most effectively, and that host health deterioration is an unavoidable cost to parasite survival. This study supports a long-held theory in evolutionary biology that parasite virulence can evolve as a trade-off of parasites optimizing their fitness.

SONAR and Art: The Application of Sound to Underwater Sculpture

Daniel Cellucci
Prof. Ralph Brown, Department of Sculpture & Studio Foundations, University of Georgia

While the use of the sound sculpture in contemporary art has existed since at least the beginning of the twentieth century, the application of SONAR, in its use as an audio and visual medium, has been largely ignored. The attempt of this research will be first to engineer an effective method of extracting and translating the audio data collected by the SONAR device, and second to apply this data in a meaningful way in the creation of a visual image. This will be accomplished by extracting the raw data from the collection device and converting them into an easily parsed data format. Additionally, special importance will be placed on the transformation of this audio data into sound that properly mirrors the image being displayed. That is, to create both a visual image as well as an algorithmically generated unique soundtrack for the subject. As the current method of displaying the particular type of SONAR data being collected for the research require proprietary programs, offering a universally recognizable translation of this data will be valuable for not only those wishing to use SONAR data for future artistic projects but also researchers who use the data in their own investigations.

Use of Cholera as a Metaphor in *Death in Venice*: Health Administrational Aspects and Gustav Aschenbach's Journey

Agni Chandora
Dr. Frances Teague, Department of English, University of Georgia

This paper explores the relationship between the changes enacted by the deadly, widespread nature of cholera and the use of cholera as a metaphor in the novella *Death in Venice* to parallel the main character's moral decline. By examining the European history of government involvement in public health, one gains better insight into the historical context of Mann's time, the early part of the twentieth century. Additionally, close inspection of the novella's text and literary articles suggested multiple interpretations of the cholera metaphor. The change Gustav Aschenbach undergoes in *Venice* relates to the physical degradation of a cholera patient and the way the world learned to cope with cholera. In the same way that cholera significantly bettered health administration at the cost of millions of lives, Aschenbach's stay in Venice allows him to discover a morally questionable, alternative lifestyle, which ironically leads him to the peak of his literary career. This intensive analysis proves the multi-layered nature of the cholera metaphor in its description of Aschenbach's development and also establishes that beneficial elements can arise from the most tragic events. The paper showcases the drastic changes an individual can undergo under the influence of desire and delves into the intrinsic aspects of human nature to examine whether moral sacrifice is necessary for art's sake.

Towards Generating a *C. elegans* Cell Line: Deregulating the Seam Cell Division Pattern by Inactivating Genes Involved in Cell Differentiation

Yu-Chien Cheng – CURO Scholar
Dr. Edward Kipreos, Department of Cellular Biology, University of Georgia

The nematode *C. elegans* is an important genetic model organism. In the past six years, three noble prizes have been awarded to scientists working with this organism. The use of *C. elegans* as a biomedical model, however, has been held back by the absence of a *C. elegans* cell line. A cell line allows the growth of a particular type of cell in tissue culture and the study of specific cells of interest with greater efficiency. Human tissue culture cells are generally isolated from either cancers or from stem cells. To generate a cell line in *C. elegans,* we focus on the adult stem cells called seam cells, which have the potential to be manipulated into generating a cell line. A cell line requires continuous proliferation of seam cells, so I am testing whether the inactivation of genes known to regulate normal cell differentiation will lead to continuous seam cell proliferation. These

genes are the cell-cycle regulators cul-1, lin-23, and cki-1, the tumor suppressor lin-35, the transcription factors rnt-1, bro-1, lin-26, elt-5, and the terminal fate control gene pop-1. I am inactivating these genes with RNA-mediated interference (RNAi). Seam cells are tagged with a vector that expresses Green Fluorescence Protein (GFP) for their visualization with a florescence microscope. The gene inactivation that produces the highest seam cell counts will be used as a starting point for making a *C. elegans* seam cell line—an invaluable tool for gaining a better understanding of the regulation pathway of adult stem cells.

Zero-Tolerance Illicit Drug Dependence Policy in the United States Military: A Need for Revision

Katherine Cherry – Roosevelt@UGA
Dr. Paul Roman, Department of Sociology, University of Georgia

The U.S. military operates on a zero-tolerance illicit drug use policy, categorizing drug users as lacking potential for sustained service and calling for their immediate discharge. This policy extends to all military personnel, including those who self-report their drug dependence. The military's policy offers no potential for re-entry and, therefore, no encouragement to seek assistance via self-report. Considering that 15 percent of Iraq and Afghanistan veterans seen at the country's largest VA in Houston, Texas are diagnosed as drug dependent upon the completion of their service, the need for this revision is apparent. If the military suspended those who self-report rather than immediately discharging them, the potential for rehabilitation and sustained service might be realized. The suspension would follow the rehabilitation model of Employee Assistance Programs, utilized by more than 80 percent of Fortune 1000 corporations. After self-reporters successfully complete drug treatment, they can continue their military careers under strict performance supervision and routine drug testing. The Department of Defense would implement this policy across all branches. An expected benefit is the improved well-being of military personnel who may have begun to self-medicate in response to their high-stress environment. Currently, the immediate discharge policy frees the military from caring for outcomes for which research shows it may have been responsible and instead places the burden of care on civilian society. Further benefits include the increased safety of those who could be potentially harmed by drug using behavior and the improved security of military families at home.

Wing Morphology, Flight Ability, and Immune Measures in Monarch Butterflies

Jean Chi – CURO Scholar
Dr. Sonia Altizer, Odum School of Ecology, University of Georgia

Monarch butterflies (*Danaus plexippus*) are well-known for their spectacular migrations along the northeastern coast of North America to over-wintering sites in Central America. In response to wounds and infections, they have a complex immune system that includes the production of hemocytes (insect immune cells) and phenoloxidase (PO) activity, which releases melanin, an important compound in immune defense also responsible for dark pigment. Bio-energetic costs associated with flight and infection are documented, but potential trade-offs among flight ability, immunity, and wing morphology are unknown. Hemocyte samples were obtained from the same individuals during larval and adult stages. Prior to flight trials, adult monarchs were scanned on a flat-bed scanner to obtain wing morphology measures (wing area, loading, aspect ratio, and color characteristics). Monarchs were tested for flight ability using a nearly friction-less flight mill; flight time, distance, initial and final velocity were measured. Preliminary analysis showed no significance between flight ability (total distance, total time, average speed, proportion of mass loss) and immune measures (hemocyte counts and PO activity), and between flight ability and most measures of wing morphology. However, there were significant relationships between average speed and proportion of black on wings, and between adult hemocyte counts and proportion and density of black. Additionally, a combination with two other data

sets showed a significant relationship between total flight distance and orange hue in wings. This has strong suggestions for sexual differences in flight ability, as males have a higher proportion of black and "redder" hues than females. Final data analysis will expound upon the costs and benefits of flight ability and wing morphology with implications for overall fitness of migratory populations.

Distinct Processing Activities Are Associated with the *Trypanosoma brucei* CaaX Proteases
Kristen Chicola
Dr. Walter Schmidt, Department of Biochemistry & Molecular Biology, University of Georgia

Many proteins undergo a series of post-translational modifications required for proper enzymatic function. Proteins possessing a tetrapeptide CaaX motif (*C*=cysteine, *a*=aliphatic amino acid, and *X*=one of several amino acids) undergo attachment of an isoprenoid lipid, proteolytic cleavage, and carboxylmethylation. This process is conserved across all eukaryotic organisms. This study investigates the activities of *Trypanosoma brucei* Rce1 and Ste24, enzymes responsible for proteolytic cleavage of CaaX proteins in this parasite. We establish that TbRce1 and TbSte24 can be heterologously expressed in *Saccharomyces cerevisiae* in functional form, as evident by their ability to promote maturation of the yeast mating pheromone, which is itself a CaaX protein. Using this *in vivo* assay and a-factor CaaX motif variants, TbRce1 and TbSte24 were deemed to possess partially overlapping substrate specificities similar, but not identical to, their fungal and human counterparts. We further establish the *in vitro* sensitivity of TbRce1 and TbSte24 to small molecules previously identified as inhibitors of the yeast and human CaaX proteases, and demonstrate that a subset of these compounds disrupts TbRce1-dependent localization of a GFP-Ras2p reporter in yeast. One compound in particular was identified that inhibited TbRce1 but not HsRce1. These results support the idea that TbRce1 may be selectively inhibited over the human isoform, further suggesting this enzyme as an effective therapeutic target in trypanosomal infections. This study also demonstrates the conserved nature of CaaX proteases across eukaryotes and supports the potential use of small molecule CaaX protease inhibitors as tools for cell biological studies of CaaX protein trafficking.

Electoral Violence in Kenya: 1997–2008
Chris Chiego – CURO Scholar
Dr. John Morrow, Department of History, University of Georgia

The last three times Kenyans went to the polls for relatively free and fair elections, political violence rocked the nation. Each time, the pattern of violence was different. In 1997 and 2002, most of the violence was concentrated before the election, while in 2007-08 most of the violence occurred after the election. The violence also varied from election to election by region, targeted groups, and even method of violence. While many press reports and publications blamed ethnicity for fanning the flames of violence, economic inequalities have been relatively ignored as an explanation. Using data that I collected through fieldwork in Kenya, including government reports, NGO reports, media reports, and firsthand accounts, I will construct a database of electoral-related violence covering the elections of 1997, 2002, and 2007. From this database and other information such as government reports, I will attempt to demonstrate that economic issues played a major role in Kenya's history of electoral violence. Looking at areas with excessively high poverty rates and noting the socio-economic status of persons involved in violence will illuminate the larger patterns behind the violence.

Social Media Use and Belonging
Elise Choe
Dr. Megan Knowles, Department of Psychology, University of Georgia

Classic and contemporary theorists in social psychology argue that humans have a fundamental need to form and maintain positive, lasting relationships with others (Baumeister & Leary, 1995; Maslow, 1954). Given humans'

intrinsic need to belong, individuals are motivated to form new social bonds, repair broken bonds, or otherwise reconstrue their social world in order to maintain a sense of connection (e.g., Gardner, Pickett, & Knowles, 2005). The present investigation explores individuals' use of social media and technology (e.g., social networking sites, blogs, online communities, and online gaming) as means of fulfilling belonging needs. In our initial study, we used a survey design to collect exploratory data pertaining to individuals' belonging needs, personality differences, loneliness, social anxiety, and frequency and type of media and technology use. We expect that individuals with a chronically high need to belong will be more likely to seek out connections via the internet than those low in this need, but this effect may be moderated by social anxiety or personality differences such as introversion. In the initial study it was found that there is a positive correlation between high Facebook usage and high extroversion. The other data were found to be insignificant. The small number of participants and the type of technology the participants used was limited. Therefore, an upcoming follow-up study, with college students, will be targeting a more specific population and will more directly compare the frequency and consequences of social media and technology use and that of in-person social interaction to determine if there is optimal ratio of computer-mediated to in-person communication for psychological well-being.

Intoxicating Misery
Caitlin Christopher
Prof. Bala Sarasvati, Department of Dance, University of Georgia

The solo *Intoxicating Misery* that I will present originated from a choreographic study using crafting devices that I did in my composition course. Although my piece was based on a character study of a woman trapped by her own emotion, I still wanted the choreography to be technical and athletic. Sometimes choreographers sacrifice line and shape in order to focus on the emotion they are trying to portray. I wanted the movement to be as complex as the emotions behind the lyrics of Aretha Franklin's "Never Loved a Man" which possesses elements of tragedy, hatred, and self-loathing but remains passionate and sensual. My goal was to show that one does not have to forget form to illustrate an emotion. With the help of some of the crafting devices such as augmentation, diminution, mirroring, transposition, and inversion, I was able to develop a solo that had a cohesive, specific style that remains technical while illustrating the complexity and depth of human emotion.

***Why So* – Exploring Non Conventional Roles of the Male and Female in Dance Partnering**
Marie Clark and Alexandru Muresan
Prof. Bala Sarasvati, Department of Dance, University of Georgia

Why So was originally created as part of a dance composition course. The focus of this creation was to move away from the traditional roles given to males and females in dance. Instead of developing movement centered on a loving or sexual relationship, the initial choreography was inspired by a fight. The choreographers found motivation from many fight styles, including mixed martial arts and boxing. Movement was actualized from this motivation and brought together with other pedestrian movement as well as limited traditional dance movement to create the duet. The male and female figures participating in this piece do not illustrate the age-old roles, but instead represent two sides of a struggle in a single person.

Vesicular Stomatitis Virus in Infected Cattle
Caroline Colden
Dr. Corrie Brown, Department of Pathology, University of Georgia

The Vesicular Stomatitis Virus (VSV) is a single, negative-stranded arbovirus in the Family Rhabdoviridae. VSV infects cattle, pigs, and horses in specific tissues, primarily the coronary bands (CB) of feet, tongue, planum rostrale, planum nasale, and teats, causing vesicular (blistering) lesions. Infection can have debilitating effects on the animals, posing a huge threat to the food and livestock industry. The

disease can be transmitted via animal-to-animal contact or via insect bite. The pathogenesis of VSV is currently not well understood making it difficult to devise effective control methods. Using molecular techniques, VSV RNA has been shown at the site of the inoculation and draining lymph nodes only, with no subsequent spread. The demonstration of viral proteins via immunohistochemistry (IHC) would allow a more precise viral localization within the tissues, leading to a better understanding of how the virus reaches the draining lymph nodes from the site of inoculation (CB). In this experiment, IHC was used to detect viral protein in the CBs from six steers inoculated via scarification of the CBs with VSV serotype New Jersey. Animals were euthanized at 12, 24, 48, 72, 96, and 120 hours post-infection. Our IHC results demonstrated that virus was effectively replicating to produce viral protein in keratinocytes of the coronary bands. Preliminary results revealed focal and light positive immunohistochemical staining at 12 hours post-infection. As the infection progressed to 24 and 48 hours, positive staining with increased intensity and wider distribution occurred as the lesion became more defined. At 72 and 96-hours post-infection (HPI) IHC staining became less intense, with higher intensity staining more localized in keratinocytes surrounding the vesicle formations. After infection had occurred for 120 hours, however, staining became much more localized to a few areas surrounding the vesicle and with weaker staining intensity. Therefore, this experiment shows the peak of virus replication at the inoculation site is between 24 and 72 HPI. After 96 HPI, mechanisms associated with host response might play a role in keeping VSV from further replication and subsequent spread.

Mandatory Impact Fees: A New Growth Management Strategy for Georgia

Rocky Cole
Dr. Andrew Carswell, Department of Housing and Consumer Economics, University of Georgia

Over the past fifty years, urban sprawl has become the predominant form of urban growth in America. While many Americans find sprawl aesthetically unpleasant, few identify it as the root cause of many growth related problems. Neglected infrastructure, including deferred roadway maintenance, and overcrowded public schools are both negative outcomes associated with unchecked outward expansion. Scholars consistently rank Georgia as one of nation's most sprawling states. Despite the early enactment of growth management legislation, Georgia has largely failed to curtail sprawl. Inherent weaknesses in Georgia's growth management strategy, including rigid political beliefs in local autonomy, continue to cripple the state's management efforts. If Georgia is to limit the negative consequences of sprawl during times of rapid development, a new method for financing capital improvements is necessary. This paper offers a solution to Georgia's growth management problem that will ensure future development pays for itself. Following a brief discussion of the costs of sprawl, survey data collected by the Georgia Municipal Association are used to empirically evaluate sprawl in Georgia. The state's past growth management strategies are then reviewed, and their effectiveness at limiting low-density development evaluated. Interviews with state and local officials supplement the investigation. Finally, the case is made that mandatory impact fees for new development, or one time fees paid by developers to finance the additional infrastructure required (i.e., roads, schools, and sewer lines), can encourage more efficient uses of existing infrastructure without slowing overall growth.

A Season of (Info) Sharing: An Empirical Investigation of Intelligence Reform

Rocky Cole and Chris Chiego
Dr. Loch Johnson, Department of International Affairs, University of Georgia

Following the Iraq weapons of mass destruction (WMD) intelligence failure of 2003, Congress enacted the Intelligence Reform and Terrorism Prevention Act (IRTPA). The legislation reorganized the intelligence community to facilitate greater cross-agency sharing of raw intelligence and more frequent inter-agency cooperation, creating a Director of National

Intelligence and a National Counterterrorism Center. Though IRTPA marginally improved information sharing practices, it failed to address the flaw in the intelligence process which was most responsible for leading policymakers to believe that Iraq had weapons of mass destruction: the threat of consensus thinking, commonly known as groupthink. To test the hypothesis that groupthink played a role in the 2003 Iraq WMD intelligence failure—and that it is not receiving comparable levels of attention from intelligence professionals as information sharing—we conduct an empirical investigation of IRTPA by developing an Intelligence Reform Lexicon, or a dictionary of terms associated with intelligence reform. We use intext computer software to machine code government agency, think tank, and academic literature, as well as Congressional testimony, from 1993 to 2008. We then use the data to derive "Lexicon Scores," or percent values, of the average amount of annual coverage devoted to specific aspects of intelligence reform. Our results support our hypothesis that groupthink played a role in the recent intelligence failures, and that in order to mitigate the negative affects of groupthink, the intelligence community needs to conduct more extensive academic outreach.

Child Care Foundations: A Model for Employer-Based Child Care Subsidies in Athens-Clarke County, Georgia

Lauren Coleman – Roosevelt@UGA
Dr. Amy Kay, Department of Child & Family Development, University of Georgia

Athens-Clarke Count (ACC), Georgia struggles with a startling poverty rate of 28.3 percent. Defined as one of 91 persistently poor counties in Georgia, ACC has approximately 26,000 residents living in poverty. Fortunately, the community has recently fostered a public discourse on how to reduce poverty through the advocacy group One Athens, including early childhood care as a major issue. Early childhood care and developmental programs have the potential to attack poverty from the bottom up by closing the gap between students as they enter kindergarten. Currently, the cost for families to invest in child care generally comprises a sizeable percentage of total household income. The insufficient funds currently allocated to child care subsidization in Athens are limiting what low-income families can do to better the lives of their children while still struggling to provide for their households. In an effort to support the working families of ACC, the local government, in a partnership with the Athens area Chamber of Commerce, should engage in an initiative encouraging businesses to provide direct subsidies for child care. The ACC government should provide incentives for companies to participate by utilizing current tax credits available from the state of Georgia and minimal funding from the county. Engaging tin the smart business practice of employer-based child care subsidies, companies will achieve a stable labor force in the short term while enriching the employees of the future. This practice will foster a mutually beneficial relationship between employers and laborers through non-monetary benefits, such as increased morale and reduced turnover. It is my aim to construct an effective public policy that has the ability to be applied in Athens. Through interviews, a review of pertinent academic literature, and an analysis of existing programs in other cities, I will construct a program to help employers more widely provide child care in Athens-Clarke County.

***Lay Down Your Heart,* a Travel Memoir**

Rebecca Corey
Prof. Reginald McKnight, Department of English, University of Georgia

This travel memoir is based on a journal kept by Rebecca Corey over her ten-week stay in Tanzania, Africa in the summer of 2006. The author describes her experiences as a primary school teacher at a center for orphaned and impoverished youth, her travel around the country, her reflections on tourism, the volunteer experience, and African culture, and her research on Tanzanian proverbs. This multi-media creative non-fiction piece includes illustrations, photographs, and narrative writing. In her work, Corey addresses the private aspects of travel and self-discovery as well as the broader realms of tourism and global service

initiatives in a developing country. She places her experiences in the wider context of travel and service in Africa, ruminating on the joy, fear, and discovery that characterized her stay in Tanzania. She illustrates the sense of fulfillment created by civic engagement and humanitarian work while also discussing the challenges and frustrations those activities often entail. Corey's work is informed by her concurrent research on the existing body of creative non-fiction and travel writing, as well as her research on the proverbs of Tanzania conducted in June and July of 2006.

Puerto Rican Feminist Thought: Boricua

Celina Correa
Dr. Doris Kadish, Department of Romance Languages, University of Georgia

What does the word "Latina" mean? When most feminists (in the USA) think of Latinas, they think of Latina women in the United States, and possibly Mexican women that identify as Chicana. That is a wonderful way to think of Latina women, but it does not represent the entire Latina population. Throughout this essay, the word "Latina" will not be rejected but only expanded. I will break it down in order to show that, although generalizing is necessary, it also can be very problematic for Latinas. I will then turn to Puerto Rican women and demonstrate how such a small island in Latin America/Caribbean, can have over four different self-identities for women and how that relates to the word "Latina." Examining Puerto Rican feminist thought will demonstrate how Puerto Ricans are part of the overall Latina feminism, as a union, and with intersectionality, all at the same time. I will then emphasize the challenges of dominant discourses within feminism with regards to underrepresented Latinas and how they are and are not seen. I make reference to different scholars and analyze their multicultural feminist thought. This essay is highly significant in the category of Puerto Rican feminist thought because a large portion of Puerto Rican feminists have written mainly in Spanish. My purpose is to shed some light on such topics in English, so that feminists in the dominant discourses continue to develop their access to such discussions, as well as knowledge of the multiplicity of Latina Feminism.

Marketing the Non-Profit Global Text Project to Universities in Developing Economies

Jessica Craven and Sarah Alongi
Dr. Richard Watson, Department of Management Information Systems, University of Georgia

Mass education has created many opportunities, particularly for the developing world. The Global Text Project aims to build a library of open-source textbooks targeted towards students at universities in developing economies. The open-content Global Text Project library provides affordable educational materials. Issues arise in creating awareness and adoptions of the books by the project's target audience. Thus, marketing efforts for the project involve three traditional channels: Internet, personal selling, and public relations. As a non-profit in the early phases of development, Global Text relies on these three channels through cold contacts derived from a UNESCO global university database, conferences and resulting contacts, and on campus initiatives. Because these channels yielded few results, the Project adopted a revised marketing plan based on the non-profit marketing model using joint venture co-branding with non-governmental organizations, government agencies, and other academic societies. Through co-branding, Global Text aims to combine resources with well-established organizations to further the shared purpose of providing affordable books. The Project's new marketing plan is focused on universities in Anglophone, politically-stable African countries, including Ethiopia, Lesotho, Botswana, Namibia, Ghana, and South Africa. Success in co-branding with other organizations should increase adoptions of the open-source textbooks.

News in the Black Belt: Teaching Journalists How to Cover Poverty in Persistently Poor Counties

Carolyn Crist – CURO Summer Fellow
Prof. John Greenman, Department of Journalism, University of Georgia

In the 1990s, many larger newsrooms across the nation employed reporters on a "poverty beat" to discuss financial difficulties in their communities. Now, as large newsrooms lay off hundreds of employees and reduce specialized beats, newspapers are increasingly focusing on local communities. As the trend continues, journalists must learn how to convey information through their local identities and sense of place to explain poverty in persistently-poor locations. We pinpointed 14 newspapers in middle and southern Georgia that are located in generationally-poor areas and attempted to discern whether a workshop would be beneficial to teach them how to cover poverty in interesting and relevant articles. Because poverty affects all aspects of the community—crime, health, business and education—we propose coverage should be taught to all reporters as a "horizontal" beat to be covered in all areas rather than as a "vertical" beat that is given only to one reporter. Through articles explaining history, narratives, and tradition, reporters can draw in readers and educate them about the effects of poverty in their community. National statistics, surveys, and legislation can be used at a local level to explain poverty trends, and this paper gives specific ideas to incorporate poverty coverage in beats across the newsroom. The 14 newspapers observed in this study were divided on how they currently acknowledge and cover poverty, and each must find its own way to correctly cover the issue in its market. All agreed on one idea - in times of economic recession, a workshop that would cost money and take time from the office is not ideal. We propose to create a Web site in fall 2009 that will teach newspapers from all backgrounds and paths how to cover poverty simply in their communities through several stories that can be published at any time. If followed, increased poverty coverage will reflect local struggles with the diminished economy, highlight areas where the local government can aid community members, decrease stereotypes associated with poverty, and increase understanding about the poverty cycle usually located just down-the-street.

Meat Out of the Eater

Jordan Dalton
Mr. Mark Callahan, Artistic Director, Ideas for Creative Exploration, University of Georgia

Meat Out of the Eater is a collaborative performance with Lara Glenum, a poet and PhD candidate in UGA's Creative Writing Program, Cal Clements, a pataphysician, experimental theater director, and founder of a local yoga studio, and Mia Mäkilä, a Swedish painter. The work is based around and named after the second half of Lara's most recent book, *Maximum Gaga*, which is a hybrid poem-play retelling the myth of Pasiphäe, the wife of King Minos, who enlists the help of the inventor Daedelus to construct a machine to assist her in copulating with a bull. From this act is born the monstrous hybrid, the Minotaur. The centerpiece of this multimedia performance is an interpretation of Daedalus's epic machine. A cart, like that of a merchant in the market, but covered in and with strange instruments that seem to exist somewhere between "of torture" and "of sound-making" appears a wardolly. Bone rattles, metal bowls, and wire strings cover the cart, and all are amplified. The musicians who use this cart for improvisatory (and most likely other, more menacing) purposes seem somehow to be part of the machine. Tubes and tethers of cable that seem strangely alive tie them to the wardolly, and the cart and the musicians are similarly tied to the room of the performance itself. The poet herself is also involved. Her words echo throughout the space and provide an improvisatory framework to which the musicians respond and accompany. She, too, is tethered. No one seems to be free from the giant, pulsating, noisy machine. Moving images are on the walls. They are tied to the poet's language; they are more literal visual representations of the words and sounds that fill the space. An animation, Mia's commission from across an ocean, is a particular highlight,

and even the room's convulsions seem to pause for a minute to watch. Everyone, including the room, is costumed. The sort of garb that makes one afraid that, with each layer peeled off of the body, thousands more, each one more disturbing than the last, lie waiting to be revealed. Tubes, cables, and piles of unidentifiable matter litter the floor of the space.

Late Ming Dynasty Jingdezhen Ceramics in a Changing Economic and Cultural Context
Amy Davis
Dr. Ari Levine, Department of History, University of Georgia

An internationally respected art form, Chinese ceramics provide an interesting starting point for any art historical research. This research investigated an important time of change in China's ceramic history. During the late Ming dynasty, economic decline led to the end of imperial patronage of Jingdezhen kilns, forcing potters to find new consumer markets. Careful examination of the functionality and formal qualities of several specific Jingdezhen export wares, along with a study of the symbolism found in ceramic surface decoration, indicates probable uses and markets for porcelain produced during the late Ming dynasty. An in depth study of late Ming dynasty culture and Jingdezhen porcelain production practices also indicated that many artisans made works specifically targeted to the cultural values and customs of new national and international consumers. By adapting to needs and demands of new consumer groups, Jingdezhen potters were able to thrive despite a complete loss of imperial patronage. Because of the flexibility of the porcelain industry, Jingdezhen emerged as the world's major center for export ceramics. By studying the history of Chinese ceramic art, one can gain a greater understanding of contemporary Chinese art. Contemporary Chinese art is heavily influenced by both China's past and China's current socio-political issues. A better understanding of how China views her own socio-political situation can thus be obtained from Chinese art in antiquity. Given China's position as a growing major political power, it is essential to understand China's own views about her place in the world.

Long-Range Retrograde Neurotrophic Signaling in Mouse Sympathetic Neurons
Logan Davis – CURO Summer Fellow
Dr. James Franklin, Department of Pharmaceutical & Biomedical Sciences, University of Georgia

Developing vertebrate neurons depend on target-derived growth factors for survival and neurotrophic support. The precise molecular mechanisms underlying long-range transduction of survival and trophic signals remain unclear. When nerve growth factor (NGF) is withdrawn from sympathetic neurons *in vitro*, a complex intracellular molecular cascade results, leading to caspase-mediated protein degradation and death. A dramatic increase in reactive oxygen species (ROS) that is a critical component of the apoptotic cascade takes place in these cells soon after withdrawal. Neurons can be rescued by late re-addition of NGF which rapidly suppresses ROS production. This suppression is evidence of a rapid survival signal. I will plate mouse superior cervical ganglion (SCG) neurons in novel microfluidic chambers developed at the University of California, Irvine, in which soma are separated from their distal axons. Cells will be deprived of NGF in both somal and distal axon compartments. Somatic ROS levels will be determined by confocal microscopic imaging of neurons loaded with CM-H_2DCFDA, a cell-permeant indicator of ROS that is non-fluorescent until oxidation occurs. An immediate decrease in somatic ROS production after re-addition of NGF to the distal axon compartment would offer evidence that a *long-distance* rapid survival signal takes place in sympathetic neurons. The rate of movement of the signal may allude to underlying mechanisms. Many neuropathologies will be better understood by the clarification of mechanisms underlying survival signaling, and this research could have important clinical ramifications.

Moods, Emotions, and Occupational Identities: A Test of Affect Control Theory
Long Doan – CURO Scholar
Dr. Dawn Robinson, Department of Sociology, University of Georgia

Affect control theory is a quantified theory that predicts the actions taken by individuals to maintain their cultural identities in certain situations. It also predicts likely emotions due to such interactions. Affect control theory makes its predictions based on the three-dimensional numerical profile (EPA) of actors, behaviors, settings, and emotions. Most tests of the theory to date have taken place in the laboratory or idiosyncratic field settings. This paper aims to accomplish two things: to find out whether occupational identities have become so salient that they can be sole predictors of emotion and to test the effectiveness of affect control theory in predicting those emotions using nationally representative data. Using the 1996 General Social Survey (GSS) as empirical data, the author analyzed the correlation between the EPA values of one of thirteen moods and emotions and the EPA values of ninety-seven occupational identities. To answer the second research question, the author generated characteristic emotions of ninety-seven occupational identities using affect control theory and calculated the geometric distance (deflection) between those characteristic emotions and the thirteen moods and emotions asked in the GSS. The author then analyzed the correlation between the deflection, which represents unlikelihood, and the likelihood of GSS respondents' experience of one of thirteen moods and emotions. Results show that occupational identities do not make good predictors of moods and emotions, but affect control theory increases the significance of those predictions.

Facial Identity Recognition: Perceptual Narrowing From Infancy Through Adulthood
Lauren Doyague, Elizabeth Simpson, and Krisztina Varga
Dr. Janet Frick, Department of Psychology, University of Georgia

Infants experience perceptual narrowing (i.e., a process in which perception starts out broadly tuned to all stimuli and then narrows) months after birth. Our study focused on examining human infants' transition from being "face generalists"—discriminating facial identity for numerous species—to being "face specialists"—becoming experts in discriminating human faces. Our aim was to determine the breadth of human infants' abilities to discriminate the facial identity. To these ends, human 6-month-olds (N=65) and adults (N=30) were tested to determine whether they discriminated the facial identities of male humans, capuchin monkeys (*Cebus apella*), and sheep (*Ovis aries*). These species are phylogenetically more distantly related to humans than species previously used. The experiment began with a familiarization period, during which infants accumulated 20 seconds of looking to a face, and then a visual paired comparison task assessed their relative interest in the familiar face to the novel face (i.e., by recording eye movements). Adults had a similar familiarization period and then made key press responses to the novel face. Adults had faster and more accurate recognition for the human faces, relative to monkey and sheep faces (p<.001). Six-month-olds had longer look durations to the novel faces compared to the familiar faces (p=.005). This is noteworthy because this shows that young infants can discriminate facial identity of distantly related species. This shows infants' abilities are broader than previously thought. Moreover, this suggests that with time, infants transition from being "face generalists" to being "face specialists."

The Effects of Corticosterone on Stress-Induced Weight Loss and Corticotrophin Releasing Factor mRNA Expression in the Paraventricular Nucleus of the Hypothalamus
Rachel Doyle
Dr. Ruth Harris, Department of Foods & Nutrition, University of Georgia

The majority of people who lose weight have difficulty maintaining the weight loss. Rats lose weight when stressed and never return to the weight of the control group. Stress is sensed by

the paraventricular nucleus of the hypothalamus which releases corticotrophin releasing factor (CRF) activating the hypothalamic-pituitary-adrenal (HPA) axis. The HPA stimulates the adrenal glands to secrete corticosterone. Adrenalectomized rats have had their adrenal glands removed. This study examined the effects of repeated restrained stress on both intact and adrenalectomized rats to examine the effect of changes in corticosterone on weight loss, and on CRF in the hypothalamus. There were six groups of rats consisting of various combinations of repeated restraint, adrenalectomy, and replacement of corticosterone in adrenalectomized rats. The restrained rats were stressed for three hours a day on three consecutive days. Adrenalectomized rats lost half as much weight during restraint as intact or adrenalectomized rats given corticosterone replacement. Non-stressed adrenalectomized rats given corticosterone also lost weight but this weight loss and that in restrained adrenalectomized rats was reversible. Thus, both naturally occurring and injected corticosterone causes weight loss, but stress is needed for the sustained weight loss. In a second set of rats, brains were collected at the end of day two of restraint for in situ hybridization. CRF mRNA expression levels increased in the hypothalamus of adrenalectomized and restrained rats, but there was no effect of corticosterone replacement. Therefore, corticosterone plays a role in sustained weight loss but does not act on hypothalamic CRF mRNA.

Adverse Effects After Administration of an Ionic Iodinated Contrast Media in Dogs

Amanda Farmer
Dr. Erik Hofmeister, Department of Small Animal Medicine, University of Georgia

Ionic iodinated contrast (IIC) media are commonly used in veterinary medicine for contrast-enhanced computed tomography (CT) and can provide significant diagnostic benefits. However, clinical experience has reported hemodynamic alterations, including changes in arterial pressure and heart rate, in a small percentage of dogs following intravenous administration of the contrast agent. The purpose of the study was to identify and determine the frequency of hemodynamic alterations associated with the administration of IIC media in a large number of anesthetized canine patients. Anesthetic records of clinical patients anesthetized between 2002 and 2008 were searched, and 49 dogs met the inclusion criteria. Values for direct arterial pressure and heart rate were recorded at the time of contrast administration and again during the 15 minute interval following the injection. Results of this study indicated that over 93% of dogs developed some increases or decreases in hemodynamic conditions, and the frequency and intensity of these alterations were considerably higher than those found in previous studies involving both human and animal patients. In addition, over 20% of patients experienced a 20% or more change from baseline mean arterial pressure, and over 12% experienced a 20% or more change from baseline heart rate following contrast media administration. As advanced imaging techniques become more common in veterinary practice, and the administration of IIC media is performed more frequently, an understanding of the frequency and types of reactions following contrast medium administration becomes increasingly valuable.

The Effects of Extubation with Varying Degrees of Endotracheal Tube Cuff Inflation on Endotracheal Fluid Volume in the Dog

Amanda Farmer
Dr. Erik Hofmeister, Department of Small Animal Medicine, University of Georgia

In veterinary medicine, an endotracheal tube (ETT) is frequently used for airway management during anesthesia, and proper inflation of the ETT cuff is critical for patient safety. During extubation, the ETT cuff is routinely deflated before removal so that no trauma is caused to trachea and the larynx. However, if there is significant fluid build up around the tube, the ETT is sometimes removed with the cuff inflated or partially inflated to avoid aspiration of fluid proximal to the cuff. The purpose of this study was to investigate the effective protection against liquid aspiration in canines provided by

the removal of inflated and deflated ETT cuffs. Sixteen female beagle cadavers were orotracheally intubated in lateral recumbency, and the ETT cuffs were inflated to a closing pressure of 20 cm H2O before barium was introduced anterior to the cuff. The dogs were randomly assigned to an ETT cuff extubation condition of deflated or unchanged from the original closing pressure. After extubation, thoracic radiographs were obtained, and the radiographs were assessed to estimate the amount of barium remaining in the trachea. Results of this study indicated that the dogs in the deflated ETT cuff group had an average of 0.9 mL more residual intratracheal contrast than dogs who were extubated with an inflated ETT cuff. If there is concern about intratracheal fluid buildup during anesthesia, extubation with the cuff inflated will remove contents and may decrease the likelihood of aspiration.

Analysis of the Transcriptional Regulation of Pax6 in the Eye

Amina Farooq
Dr. James D. Lauderdale, Department of Cellular Biology, University of Georgia

Pax6 is a member of the paired-family of transcription factors that exhibits a very specific and restricted spatiotemporal expression pattern within the developing eye and nervous system. Incorrect levels of Pax6 expression have been shown to lead to developmental abnormalities. Little is known about the transcriptional mechanisms by which Pax6 expression is regulated. Previous analysis has shown the complexity of Pax6 regulation through the identification of multiple enhancer elements which interact to produce a tight regulation of Pax6 expression. The requirement of certain sequences within Pax6 for expression in various regions of the developing organism has also been demonstrated by targeted sequence deletion studies. We show here that, in addition to the already identified enhancer elements regulating Pax6 in the lens, it appears that a key lens regulatory sequence lies within the downstream regulatory region of Pax6. Immunohistochemistry was used to detect the fluorescence tagged transgene, and demonstrate that a putative eye regulatory region is necessary for the maintenance of Pax6 expression in lens cells. Using bioinformatic sequence analysis, we demonstrate that the identified downstream regulatory region contains the information needed for correct spatiotemporal expression of Pax6 in the retina. These data shed more light on the specific mechanisms governing Pax6 expression within the eye, by showing the differential regulation of Pax6 in the lens relative to other structures of the developing eye. Further elucidation of the precise regulatory mechanisms of a key developmental gene like Pax6 will provide crucial information for those working to therapeutically clone ocular tissue in an effort to provide effective treatment for individuals with ocular disorders.

Studying the Genetic Diversity of the Var2csa Gene

Opeoluwa Fawole – CURO Apprentice
Dr. David Peterson, Department of Infectious Diseases, University of Georgia

Plasmodium falciparum is a parasite transmitted from mosquitoes to humans that causes the most severe incidences of malaria. Our research focuses on placental-associated malaria, which is mediated by the var2csa gene product found in parasites that infect pregnant women in Africa. Our goal is to study the gene sequence diversity of var2csa among various parasite isolates extracted from infected pregnant women. We expect to differentiate regions of variability and conservation among the var2csa gene sequences and use these data to ultimately predict which areas can be presented by human leukocyte antigen class II molecules. In our study, we have used placental blood samples obtained from pregnant women infected with malaria in Kenya. We use PCR to amplify a region of the var2csa gene and then employ a cloning reaction to find and isolate the unique sequences for analysis. So far, we have 68 sequences from 6 placental blood samples. After aligning and comparing the regions, we analyze the diversity among the gene sequences. Initial analysis has shown that there is tremendous diversity of the sequences, that sequences from a single patient are more similar than those

between patients, and that the predicted class II epitopes (areas that can be recognized by an immunological agent) fall mostly in conserved regions. Through our studies, we endeavor to understand the development of immunity to placental malaria.

Catching the Zanies: Italian Acting and English Drama
Katelyn Foley
Dr. Erin Kelly, Department of English, University of Georgia

This paper will discuss a new reading of Francis Beaumont's English renaissance play *Knight of the Burning Pestle* in light of the Italian renaissance acting style known as commedia dell'arte. During the two decades before *Knight* was written, many Englishmen's sons traveled around Italy, observing the improvisational street performers of commedia dell'arte. On their return, they brought knowledge of this satirical art form with them. With this acting style in mind, Beaumont creates a dialogue between a romantic type of English city comedy and Italian-style improvisation through a scripted scenario "invented" by his merchant-class characters George, Nell, and Rafe. Commedia dell'arte and its English bourgeois counterparts significantly inform Beaumont's satirical commentary within his play. However, very few attempts to correlate the English and Italian renaissance acting styles have been made, and there are no critical studies that discuss improvisation within both forms in relation to Beaumont's *Knight*. Through examination of the play, especially its improvisational scenes; English translations of commedia dell'arte scenarios; accounts of Englishmen traveling in Italy; and improvisational performance traditions, this essay exposes the existence of a vital exchange between Italian acting and English renaissance theatre and culture and discovers a new context for Beaumont's *Knight*, creating a new understanding of satire and comedy within the play.

Approaching Iran: Alternative Diplomacy
Charles Ford – Roosevelt@UGA
Dr. Sherry Lowrance, Department of International Affairs, University of Georgia

Thirty years after the Iran hostage crisis, American diplomatic relations with Iran remain limited. Political, social, and cultural barriers continue to prevent the emergence of fruitful diplomatic ties between the two nations. The pro-democratic, capitalist United States has attempted to force Iran into the global system by pressuring them with embargoes, sanctions, freezing of Iranian assets in the United States, and the threat of military intervention. These aggressive methods of diplomacy have clearly resulted in a lack of Iranian cooperation. Alternative methods of diplomacy (i.e., third party neutrality, peace talks, etc.) and their effectiveness at solving hostile relations in other parts of the globe will be analyzed and applied to the situation surrounding the United States and Iran. For example, the effectiveness of Jimmy Carter's shuttle diplomacy during the Camp David Peace Accords could be implemented when dealing with the United States-Iran conflict. Egypt and Israel would be replaced by Iran and the United States. Differences could be listed, tradeoffs made, and a consensus reached in the same manner it was in 1978. Also, private, non-publicized peace conferences have proven to be effective in stimulating subtle policy shifts and innovation for new programs of establishing peace. This method, in addition to others, will be applied to Iran and the United States. Though relations with Iran have been heated in recent decades, perhaps an understanding of each other's goals and preferences found through approaching the situation in an alternative manner might be the key to improving the current conflict.

Bipedal Stair Climbing Robots
Alex Fouraker
Dr. Chi Thai, Department of Biological & Agricultural Engineering, University of Georgia

My project was in robotics engineering and the objective was to design a robot capable of walking up and down a flight of stairs. This

robot is the first in a series to determine which type of motion, compared to a human type gait, is best for carrying weight up stairs. Other methods will also be built and tested. The robot was bipedal and modeled after a bird in the respect that the knees bend backwards. This complicates some motion associated with walking upstairs. For these robots, because the CPU and servo motors response times are slow, their programming requires that they go from one static position to another and limit transitional speeds between these positions. As a result, the robot motion was designed so its overall center of gravity was always over its base so it would not fall. In other words, it required it be balanced not only at static poses but also in transition between poses. I created two working robots. One climbed a set of six stairs and, once it reached the top, walked down backward, taking the stairs two at a time. The other robot first checked to "see" if the next stair existed before moving. If the stair did not exist, the robot stopped. Because of this, the robot only takes one step at a time, hence its nickname, the "toddler" robot. This project could have implications in search and rescue and military endeavors. These web sites demonstrate the projects:
http://www.engr.uga.edu/people/thai/Bioloid/GerwalkStairs_2/
http://www.engr.uga.edu/people/thai/Bioloid/ToddlerUp6Steps/.

Analysis of Pectate Lyase Activity in Pectin-Rich Lignocellulosic Biomass Fermentations
Brian Gardner – CURO Scholar
Dr. Joy Doran-Peterson, Department of Microbiology, University of Georgia

The dependence on foreign oil in the United States has increased the demand for alternative fuels. Ethanol production from food sources in the United States could create heavy competition for the ultimate utilization of crops. However, ethanol production from pectin-rich lignocellulosic biomass provides a noncompetitive alternative fuel source. Ethanologen *Escherichia coli* strain JP07 containing the cellobiose phosphotransferase system from *Klebsiella oxytoca* and the alcohol dehydrogenase and pyruvate decarboxylase from *Zymomonas mobilis* was further engineered to express a pectate lyase from *Erwinia chrysanthemi* (casAB; pelE). To obtain effective secretion of PelE, the Sec-independent pathway out of genes from *E. chrysanthemi* on the cosmid pCPP2006 were provided to strain JP07 to construct strain JP07C. *E. coli* strains LY40A, JP07, and JP07C possessed significant cellobiase activity in cell lysates, while only strain JP07C demonstrated extracellular pectate lyase activity. Fermentation with sugar beet pulp at very low fungal enzyme loads during saccharification revealed significantly higher ethanol production for LY40A and JP07C compared to the parent strain, *E. coli* KO11. While JP07C ethanol yields were not considerably higher than LY40A, investigation of oligogalacturonide polymerization showed an increased breakdown of biomass to small chain (degree of polymerization ≤ 6) oligogalacturonides. The activity of pectate lyases along with other additional enzymes in ethanol fermentations could lead to more efficient breakdown of noncompetitive substrates to produce fuel ethanol.

H-1B Visa and Green Card Reform
Joshua Gloster – Roosevelt@UGA
Dr. Scott Atkinson, Department of Economics, University of Georgia

H-1B visas and green cards for high-skilled foreign workers have had an almost entirely positive effect on the American economy. H-1B visas, which are temporary non-immigrant visas, and green cards, which allow for permanent residence, are being issued at too low of a rate, even considering the decline in growth of the American economy. Support for removing the cap on H-1B visas and green cards will be based on analysis of current literature regarding the shortage of high-skilled labor in America, free market solutions to immigration issues, and the failure of other policies to solve the labor shortage. Due to the need for a greater number of skilled workers, and to lessen the problem of outsourcing, Congress should pass legislation to enact both H-1B visa and green card reform. Currently, corporations like Google and

Microsoft have to get around H-1B visa restrictions by outsourcing jobs overseas. Lifting the cap on H-1B visas will help end this detrimental process. Also, the green card application process should be simplified so H-1B workers who deserve green cards can obtain them. Positive effects will include an increase in the sense of acceptance among H-1B workers, an increase in their sense of civic responsibility, and incorporation of these workers within the tax base. The complaints of American high-skilled workers should be taken seriously and properly addressed, but the potential benefits of H-1B visa and green card reform prove that they outweigh the costs.

Decision-Making Strategies of Wild Capuchin Monkeys

Rebecca Greenberg – CURO Summer Fellow
Dr. Dorothy Fragaszy, Department of Psychology, University of Georgia

Wild bearded capuchin monkeys (*Cebus libidinosus*) use stone tools to crack open tough palm nuts to ingest the kernel. Optimal foraging theory recognizes alternative strategies that individuals adopt in complex foraging circumstances to maximize some benefit (e.g., energy intake) or minimize some cost (e.g., risk of predation). Nine monkeys from a well-documented group of wild bearded capuchins were studied over a four-week period in Piauí, Brazil. In this special context, the monkeys are faced with decisions about which nuts to crack and which stones to use. To determine which optimizing strategy (maximize payoff, minimize effort, or maximize the reliability of payoff) that these monkeys use when they crack nuts, they were given a choice of two nuts differing in resistance and two manufactured stones of same volume but different mass. Other experiments allowed the choice of two manufactured stones with one hard nut so that the choice of stone was more important. Monkeys consistently selected the nut that was easier to crack and the heavier stone when the stones differed in weight by at least 500 grams. This study suggests that capuchins are sensitive to properties of stones and nuts, as reflected in their choice of materials for cracking nuts. The findings best match a strategy to maximize the reliability of payoff. Tool use in these monkeys (and other species, including human ancestors) can be understood from an ecological perspective, as well as from the (more common) cognitive perspective.

The Role of Hirano Bodies and the Amyloid Precursor Protein in Alzheimer's Disease

Nisha Gupta – CURO Scholar
Dr. Marcus Fechheimer, Department of Cellular Biology, University of Georgia

Hirano bodies are cellular formations found in patients suffering from neurodegenerative diseases. However, the physiological function of Hirano bodies is not yet understood. Alzheimer's disease is a degenerative disease characterized by the loss of neurons and formation of plaques in the brain. These plaques primarily consist of the protein amyloid-beta (Aβ), which is derived from transmembrane molecule known as the amyloid precursor protein (APP). When cleaved intracellularly, APP forms smaller molecules, including the C31 fragment which has been recently shown to be lethal to neurons. Furthermore, studies have shown that when the C31 protein is mutated, there is a decrease in both Aβ and C31 toxicity (Lu, et al., 2003). Although the mechanism of injury to the cell in Alzheimer's disease is not fully known, the role of APP, Aβ, and C31 have been implicated. Because of the observed association between Hirano bodies and Alzheimer's disease, we investigated the relationship between Hirano bodies and the neurotoxic effects of C31. In a previous study, Hirano bodies were shown to sequester and protect against AICD, another neurotoxic fragment of APP (Ha, et al., 2008). In the current study, experiments were conducted in human embryonic kidney (HEK) cells in which Hirano bodies formation was induced with either C31 or a mutated form of C31 (mC31). Cells expressing C31 had an increased rate of death, while cells expressing mC31 were healthy. This observation indicates that cell death was caused by C31-induced neurotoxicity. Further experiments suggest that Hirano bodies are protective against C31-mediated death.

Presence of Apoptosis, as Determined by Immunohistochemistry, in Lymphoid Tissues of Chickens Infected with Strains of Newcastle Disease Virus of Varying Virulence

Laura Harrison – Roosevelt@UGA, CURO Scholar
Dr. Corrie Brown, Department of Pathology, University of Georgia

Newcastle Disease Virus (NDV) poses many threats to the poultry industry. Whereas low virulence strains often circulate with minimal disease, high virulence strains can rapidly sicken and kill an entire house of chickens. Presence of any virulent viruses within our country will seriously damage our abilities to export chicken meat or live birds. The last outbreak of virulent Newcastle disease in the US happened in California in 2002-2003. That outbreak claimed the lives of 4 million birds, required 8 months to eradicate, and cost over $300 million dollars to the industry. Because apoptosis, or programmed cell death, serves as a key defense mechanism during viral infections, increased knowledge concerning apoptosis is essential in understanding host-pathogen interactions. Immunohistochemistry (IHC) for active caspase-3, a key enzyme in apoptosis, was done on formalin-fixed, paraffin embedded sections from chickens infected with various strains of NDV. Apoptotic activity was examined in the spleen, thymus, bursa, and intestine. All tissues were harvested at two days post infection. To confirm virus presence, IHC was done for NDV nucleoprotein. Active caspase-3 expression in lymphoid tissue infected with virulent strains was significantly increased when compared to tissue infected with milder strains. Heightened apoptosis in the virulent strains may be a key component of the severe disease manifestations seen. Because severe disease manifestation results in losses to the poultry industry, generating greater understanding of apoptosis in response to NDV infection exists as an important research initiative.

Advance Directive Reform: Reducing Medicare Spending and Increasing Respect of Patients' Rights

Laura Harrison – Roosevelt@UGA, CURO Scholar
Dr. Claire Robb, Department of Epidemiology & Biostatistics, University of Georgia

Almost every elderly American citizen receives healthcare coverage from Medicare, which continues to expand in size and cost. In 2008, the number of Medicare enrollees was 44,831,390 and the program cost $300 billion. Often, efforts to contain Medicare costs complicate delivery of health care which reflects the patient's desires. End-of-life care (EOLC) contributes to Medicare spending and results in situations creating obstructions to honoring patients' rights. Through an advance directive (AD), a patient declares healthcare preferences in advance. Because an AD potentially saves money and increases respect of patients' rights, the purpose of this research was to determine the best program for AD implementation. A comprehensive literature review was conducted using databases such as PubMed, EBSCOhost, and LexisNexis Congressional. AD, EOLC, and Medicare policy were compared. Research shows that a lack of national AD policy creates barriers to AD use. Also, the work of Molloy et al. exemplifies the importance of AD education in policy implementation, as patients who received AD education had a decrease of $1200 for healthcare expenditures. Because of differences concerning views on death, there is a need for AD policy which respects a variety of stances. Research findings call for a policy with two major components: creation of a national AD by the Department of Health and Human Services and federal investment in an AD educational campaign to promote AD use.

Buddha and Uncle Sam: Investigating Contemporary Buddhism in the United States and Its Evolution

Sana Hashmi – CURO Scholar, CURO Summer Fellow
Dr. David S. Williams, Department of Religion, University of Georgia

Buddhism, based on the teaching of Siddhartha Gautama, also known as the Awakened One ("Buddha"), has experienced an amazing evolution from its origin four hundred years BCE. Unlike many other religions that utilize supernatural solutions to the suffering in the world, Buddhism uniquely focuses on the individual self as the vehicle for ending this suffering. By understanding that life is imperfect and that our desire for materialism leads to our suffering, then, as the Buddha states, terminating this desire would lead to the conclusion of one's suffering, frustration, and even faint unrest. Starting with its humble roots in India 2500 years ago, this message spread throughout East Asia, Western Europe, and, eventually, to the New World in the nineteenth century with the influx of Asian immigrants. In this process, Buddhism evolved, incorporating new devotional rituals and mystical qualities from the cultures it interacted with. Through interviewing various scholars and visiting important religious sites, both in the United States and in South Korea—a country whose Buddhist culture has been preserved by the government and is relatively unaffected by Communist, Christian, or political influence, as other Asian Buddhist countries are—I will examine the evolution of Buddhism in America and its evolution from its original roots. Through this project, this contemporary form will reveal an intricate dance between traditional beliefs and the influence of Western culture. This research is particularly important in the scholarship of religious studies in the United States. By investigating the factors that influence Buddhism in this country, we can learn about the dynamics of religion and American culture in general. The understanding of this relationship is crucial to recognizing and appreciating diversity and its effects on the American, as well as the global, community.

Indigenous Peoples and Migrants: New Nationalism in Ecuador

Liana Hervas
Dr. Pamela Voekel, Department of History, University of Georgia

In September 2008, a majority of Ecuadorians voted in favor of a new constitution that decisively places Ecuador among the left-leaning countries in Latin America. The content and popularity of Ecuador's latest constitution are the products of a strong, innovative nationalist project. Nationalism has historically been defined in terms of geographic borders and perceived cultural homogeneity. Ecuador's 2008 Constitution challenges more traditional definitions of nationalism by presenting highly inclusive ideas of citizenship. By including indigenous rights to autonomy and self-determination and constitutional rights for Ecuadorian migrants living abroad, the 2008 Constitution incorporates plurinational and transnational identities into its definition of the state. I analyze the 2008 Constitution, government and media documentation of the drafting process, the large body of historical and anthropological work on indigenous organizing in Ecuador, and documentation of second wave Ecuadorian migration to contextualize the kinds of citizenship offered by the 2008 Constitution. The Constitution's inclusion of plurinational and transnational citizenship broadens and emboldens traditional ideas of nationalism. The plurinational and transnational citizenship offered by Ecuador's 2008 Constitution inform a new kind of nationalism. Knowledge of this broadened version of nationalism provides a better understanding of Ecuadorian politics and the country's position in Latin America.

The Effects of Oxytocin on Food Sharing and Cooperation in the Capuchin Monkey (*Cebus apella*)

Carla Heyler
Dr. Sarah Brosnan, Department of Psychology, Georgia State University

Oxytocin (OT) is a neuropeptide that mediates social behaviors in humans, including trust, cooperation, and generosity. We here investigate

whether exogenous OT increases cooperative and food sharing behavior in a highly social non-human primate species, the capuchin monkey. This may improve our understanding of positive social behaviors and cooperative interactions in capuchins and help to clarify the evolutionary enigma of altruism through evidence of a mechanism by which OT facilitates cooperation. In our study, one or both subjects must pull bars linked to a tray in order to receive food (apples) on the tray. In the reciprocity condition, the tray is weighted so that both subjects must pull, though only one subject has access to the reward and must share it for his partner to receive any. In the mutualism control, both must pull and both receive a reward. In the solo control, only one subject need pull and only the same subject has access to the reward. We are testing whether OT administered intranasally will facilitate both the willingness to cooperate in obtaining rewards and the subsequent willingness to share the reward. OT administration is randomized so that in each scenario either one subject, both subjects, or neither subject receives OT (saline is the control). We will use a repeated-measures ANOVA to determine whether levels of cooperation and food sharing vary across conditions. Although data are still being collected, we predict that increased OT levels will correlate with an increase in both cooperation and subsequent sharing of the reward.

Analyzing the Function of *O*-GlcNAc in the *Drosophila* Nervous System

Marcus Hines – CURO Apprentice, CURO Summer Fellow
Dr. Michael Tiemeyer and Dr. Lance Wells, Department of Biochemistry & Molecular Biology, University of Georgia

A dynamic cycle of addition and removal of *O*-linked *N*-acetylglucosamine (*O*-GlcNAc) at serine and threonine residues is emerging as a key regulator of intracellular protein activity. Like phosphorylation, the *O*-GlcNAc modification significantly changes the function of the proteins to which it is attached. In addition, the *O*-GlcNAc modification may compete with phosphorylation for certain Ser/Thr target sites. Although there has been considerable research on documenting the functional implications of phosphorylation, the functions for *O*-GlcNAc are just beginning to be understood. A significant amount of cancer and developmental biology research is focused on phosphorylation as a regulator of cell growth and differentiation, but relatively little attention has been paid to the involvement of *O*-GlcNAc in these processes. Like kinases and phosphatases, the enzymes of *O*-GlcNAc addition, *O*-GlcNActransferase (OGT), and removal, *O*-GlcNAcase (OGA), are compartmentalized and regulated. We have capabilities to analyze the presence of O-GlcNAc on the intracellular protein. This project focuses on dissecting cell autonomous and non-autonomous functions of *O*-GlcNAc, by altering the expression of OGT and OGA within specific cells of the *Drosophila melanogaster* embryo in an effort to obtain a better understanding of the function of *O*-GlcNAc. Preliminary results have hinted that the addition of more *O*-GlcNAc in the engrailed cells of the *Drosophila* nervous system may hinder the engrailed cells' natural secretion of wingless cells. Further research on the function of *O*-GlcNAc, especially in the *Drosophila melanogaster* embryo, will continue to be conducted to obtain a deeper understanding of the glycan.

The Development and Implications of Predictive Modes of Thought from the Renaissance to Modernity

Dillon Horne – CURO Apprentice
Dr. Thomas Cerbu, Department of Comparative Literature, University of Georgia

This project shall focus on the development of predictive modes of thought, from the astrology of the Renaissance to modern probability theory. I will begin with a case study on the 16th century figure of Gerolamo Cardano. He holds special significance in this dialogue due to his early dealings with game theory, which gave rise to key precursors of modern concepts of probability. From there I shall move on to a brief overview of the correspondence between Fermat and Pascal, but with a larger emphasis on Ian

Hacking's concept of probability as an emergent concept rather than an epochal shift. The importance of this correspondence is that it made possible the idea of statistically predicting the future. The two scholars deal with the 'problem of the points,' that is, how to determine the most likely outcome of a chance game. With Hacking, I will focus on his work concerning the 'signs' of the low sciences that served to make predictions reliable, shifting from there to Pascal's wager and how that signaled the introduction of probability-based decision making. This leads into modern studies of economics, governmental policy, etc. This project will build upon other works of history of philosophy and mathematics by providing a more comprehensive focus on what exactly is probability and how it came to be. In a world so caught up in numbers, the significance of an encompassing study on the development of probability will serve to provide a basis of credibility for acting on predictions.

How AICD and Fe65 Are Recruited to Hirano Bodies

Haylee Humes – CURO Summer Fellow
Dr. Marcus Fechheimer, Department of Cellular Biology, University of Georgia

Hirano bodies are actin-rich structures associated with a number of neurodegenerative diseases, including familial Alzheimer's disease. A possible link between Hirano bodies and familial Alzheimer's is human Amyloid Precursor Protein (APP). When APP is cleaved, the intracellular portion, called AICD, will normally bind to Fe65 and go to the nucleus to initiate apoptosis (programmed cell death). Yet, in the presence of Hirano bodies, it is sequestered in the Hirano body and cell death prevented. It will be determined whether Mena is the possible connection between the AICD and Hirano bodies because it binds to both Fe65 and actin. Mena is normally found in synapses and has been found to aid in memory. To determine if Mena and Hirano bodies are co-localized in the cell, Mena-GFP was co-expressed with rhodamine-stained Hirano bodies in HEK (Human Embryonic Kidney) cells. Mena concentrated into unexpected aggregations that are rich in F-actin in the cytoplasm on one edge of the cell. Further experiments will show whether Hirano bodies are related to these novel structures or if increased Mena concentrations alone cause novel structures to form. Also, it will be determined if Mena is essential for the recruitment of AICD to the Hirano body by using Mena knock-out cells. The possible function of Mena in the AICD sequestering process or its role in the unexpected structures is very important in the search to explain the function of Hirano bodies as well as the possible implications for Alzheimer's disease.

The Effect of Titanium Dioxide Surface Area on Its Photocatalytic Activity

Whitney Ingram
Dr. Yiping Zhao, Department of Physics & Astronomy, University of Georgia

Titanium dioxide (TiO_2) is a highly effective photocatalyst under ultraviolet and near-visible irradiation. Photocatalysts such as TiO_2 accelerate photochemical reactions, and have been used to degrade organic substances. The catalysts are primary candidates as materials for hydrogen generation and the self-purification of water and air. The photocatalytic abilities of TiO_2 are limited by the quick recombination of the photogenerated electron-hole pair, slowing photodegradation activity. Previous research indicates tilted nanorods fabricated by an oblique angle deposition (OAD) technique produce a highly efficient photocatalyst; however, a systematic study of the relationship between photocatalytic activity and TiO_2 surface area has not been completed. The purpose of this experiment is to study and analyze the effect of the total surface area of the nanorod structure on the photocatalytic activity of TiO_2. Several nanorod arrays were fabricated by a custom-built electron-beam deposition system using the OAD method, with the nanorod height, and thus surface area, controlled by altering the thickness of the deposition. To quantify the photocatalytic behavior, TiO_2 substrates were placed in an aqueous solution of methylene blue (MB) and irradiated by UV light for regular time intervals. A UV-Vis spectrophotometer measured the absorption of the MB solution after each

irradiation interval, and the decay over time of the $\lambda = 664$ nm peak, which is characteristic of MB, was used to measure photocatalytic activity. Results have so far identified a direct relationship between the surface area of the nanorod substrates and their degradation rate.

From Hills to Plains: Cormac McCarthy's Use of Terrain, Landscape, and Environment
Wes Jackson
Dr. Hugh Ruppersburg, Department of English, University of Georgia

Cormac McCarthy's novels focus on two specific regions in the United States. Along with his tenth novel, *The Road*, McCarthy's first four novels are set in Appalachian Tennessee, while the next five take place around the U.S.-Mexico border. Similar to William Bartram's and Willa Cather's use of landscape and setting, McCarthy's novels chronicle 100 years of characters' relationships to the landscape and should, therefore, be examined in the context of America's literary understanding of its environment. Further, I will gauge McCarthy's influence of narrating the landscape by comparing his Appalachian narratives to more recent works about the region, such as Charles Frazier's *Cold Mountain*. The Appalachian novels provide protagonists who encounter their environment on personal levels, and these relationships emphasize different psychological and theological dynamics of their contact with landscape. The landscape in the Southwestern novels, alternatively, emphasizes America's collective response to environment by echoing the lost cultures forced out by expansionism. While many can see in McCarthy's novels a strong conservationist theme, his work delves past ideas of preservation and reveals more fundamental elements of America's collective understanding of the physical world. Ultimately, McCarthy's novels show how we relate with landscape on psychological, spiritual, and metaphysical levels.

Drugs and Deterrence
Robert Jacques
Dr. Mark Cooney, Department of Sociology, University of Georgia

The deterrence of individuals is a justification for criminal laws and their penalties. Deterrence is based on the pleasure-pain principle and the severity, certainty, and swiftness of a punishment occurring after a crime has been committed. Jeremy Bentham identifies four types of sanctions in which the pleasure-pain principle operates: political, physical, moral, and religious. A body of work has emerged in recent decades that attempts to find a deterrent effect for crimes and the punishments associated with their violation. In terms of illegal drugs, these studies are limited to how criminalization affects marijuana use. This study attempts to study how people are deterred from using and selling different drugs in terms of the sanctions identified by Bentham. Surveys and interviews were conducted with more than twenty individuals with widely varying histories of drug use and drug dealing. At first, surveys were completed and, time permitting, interviews were conducted. After it was found that interviews provided much more useful data than surveys, interviews began to be exclusively used. Social relationships and moral sanctions were found to be the most important factors influencing a person's drug habit; the law and criminal justice system was rarely attributed to having much influence in deterring individuals, even among those currently part of the criminal justice system. Since a created deterrent effect is often used to justify drug criminalization, this research may provide new insights on drug policy and how people are deterred from using and/or selling drugs.

Early Voting in Georgia: A Compromise for Accessibility and Efficiency
Alex Johnson – Roosevelt@UGA
Dr. Charles Bullock, Department of Political Science, University of Georgia

Now that nearly all adult American citizens are guaranteed the right to vote, too few actually exercise their duty to participate in the world's most prominent democracy. The U.S. ranks near the bottom of all industrialized democracies in voter participation. The state of Georgia is even worse, ranking the sixth worst state in total voter turnout. While all institutional barriers have

been dismantled, this policy proposal addresses how Georgia should encourage voter participation and eliminate inconveniences that act as a barrier to voter participation. While no panacea exists for declining participation, there are many progressive alternative voting methods that can eradicate inconvenience as an excuse for abstaining from voting. The Georgia General Assembly should pass legislation to make voting more convenient and accessible for all Georgians. To compromise opposing partisan arguments and possibly achieve improved voter turnout, Georgia should include Saturday to its successful early voting period while shortening its five week period to three weeks. Additionally, this legislation should encourage absentee ballot usage by allowing voters to become permanent absentee voters. Extending Georgians' ability to vote through these measures, this legislation's two-prong extension may increase voter participation. Registered voters who have been less likely to vote in past elections will find that participating in democracy is more convenient, less time-consuming, and beneficial to themselves and their community.

Use of Click Chemistry to Assess Glycoprotein Dynamics in Cultured Cells

Steven Johnson
Dr. Richard Steet, Department of Biochemistry & Molecular Biology, University of Georgia

Bioorthogonal chemical reporters are novel reagents in the field of chemical glycobiology that can be used for *in vivo* imaging of glycoproteins in cultured cells. Unlike large, bulky genetically encoded tags such as green fluorescent protein (GFP), these reporters are small molecules that can be incorporated into the cell's glycan biosynthetic machinery without harming the biological system. One such reporter, N-azidoacetylmannosamine (ManNAz), is a sugar analog that is capable of integrating into nascent glycoproteins as sialic acid residues. A chemical 'handle' can then be covalently linked to the azido group of incorporated ManNAz residues, allowing for the visualization of the modified glycoproteins using fluorescent probes that recognize this 'handle.' Our goal is to use this technique (known as "click chemistry") to investigate the nature and dynamics of glycoprotein storage in lysosomal storage disorders such as mucolipidosis II (ML-II), a congenital disease characterized by improper catabolism and accumulation of undigested macromolecules. Employing both epifluorescence and confocal microscopy, we have successfully visualized the accumulation of sialic acid-containing glycoproteins in the lysosomes of ML-II cells. Furthermore, the click chemistry has allowed us to view the dynamics of extracellular matrix (ECM) glycoprotein synthesis and turnover within WT cells. The application of different azide sugar precursors in other lysosomal storage disease tissues should provide us with additional ways to study the trafficking and turnover of glycoproteins in these cells. Our findings could facilitate new methods for lysosomal disease diagnosis and will provide unprecedented opportunities to track glycoprotein dynamics and turnover in affected cell types.

Characterization of an RNP Complex Involved in Invader Defense in *Pyrococcus furiosus*

Lindsay Jones – CURO Scholar, CURO Summer Fellow
Dr. Michael Terns and Dr. Rebecca Terns, Department of Biochemistry & Molecular Biology, University of Georgia

In eukaryotes, a system known as RNA interference (RNAi) provides defense against genome invaders such as viruses. Recent work indicates that an RNA-mediated system for viral defense also exists in most prokaryotes. Specifically, the prokaryotic CRISPR/Cas (Clustered Regularly Interspaced Short Palindromic Repeats/ CRISPR associated) system is a proposed analog of the eukaryotic RNAi system. CRISPR gene loci produce small RNAs known as prokaryotic silencing RNAs (psiRNAs), and Cas genes produce the proteins of this putative defense system. My research objectives were to characterize CRISPR locus transcription and to identify Cas proteins that interact with psiRNAs of *Pyrococcus furiosus*. Northern analysis suggests that CRISPR

transcription is unidirectional and produces large precursor RNAs. Furthermore, the data indicate that individual psiRNAs are generated by successive cleavages within repeat sequences adjacent to each psiRNA. To identify which of the numerous Cas proteins specifically interact with psiRNAs, we subcloned the genes of Cas proteins into *Escherichia coli* protein expression vectors. The Cas proteins were expressed, purified, and tested in RNA-protein binding (gel mobility shift) assays with RNA species representing either mature psiRNAs or processing intermediates. We identified a Cas protein that selectively and independently interacts with larger CRISPR RNA species but not smaller component RNA sequences. This RNA/protein interaction appears to recruit several additional Cas proteins to the RNA. The larger RNA-protein complexes that we have assembled may play an important role in the putative prokaryotic RNAi pathway.

Policy on the Crisis in Northern Uganda

Meredith Jones – Roosevelt@UGA
Dr. Maurits van der Veen, Department of International Affairs, University of Georgia

Northern Uganda has been plagued by over two decades of war perpetrated by the Lord's Resistance Army (LRA), a rebel army infamous for child soldiering. Although peace talks were held between the LRA and the Ugandan government between 2006 and 2008, it is now clear that Joseph Kony, the spiritual and military leader of the LRA, was never interested in negotiation. Last December, in response to a massive increase in the number of attacks made by the LRA, Uganda, the Democratic Republic of the Congo, and Sudan launched a military front against the LRA. While the fact that an alternative to peace through diplomacy was a progressive step, so far the mission has failed miserably and provoked Kony to retaliate with what have been called "The Christmas Massacres," a series of violent attacks killing over 400. If real progress is to be made toward peace, the international community must first recognize the severity of Kony's crimes. Though the International Criminal Court has indicted Kony and other top LRA leaders for crimes against humanity, the amount of action or even rhetoric concerning the crisis is disproportionate. Second, a more strategic plan for Kony's apprehension and arrest must be developed. In this area, the US can contribute the most aid through logistical support and intelligence. Lastly, a comprehensive plan for reconstruction in the northern region of Uganda must be created to secure long-term peace and stability. In order to arrive at the best policy option for ending this twenty-year-long war, I analyzed the history of the LRA and the methods that have been attempted in the last twenty years under President Museveni's rule to defeat this rebel group. I used a timeline to organize qualitative and quantitative research concerning the relationship between various policy options and the overall "level of peace," which I used to measure the success or failure of the policy action. Lastly, I examined past government action as well as case studies concerning similar rebel groups that had been successfully defeated through government action.

How Has the Gospel of John Been Used to Denigrate the Jews?

Elizabeth Katz
Dr. Wayne Coppins, Department of Religion, University of Georgia

Since over half of the references to "the Jews" in the Gospel of John suggest a negative literary association, it is not surprising that the text has been used in Anti-Semitic rhetoric throughout the centuries. While scholars today verbally acknowledge that certain verses from the Fourth Gospel have been used to denigrate ethnic Jews, little work has been done to explore such discriminatory uses. In this presentation, instead of assuming the historical-critical focus on original meaning and context, I will assume the focus of reception history, which is on such historical interpretations and uses. This talk will examine the way the Gospel of John has been interpreted and used Anti-Semitically at influential points in its history such as in the Early Church documents, Luther's writings, and Nazi rhetoric. It seems these earlier interpreters read the term "the Jews" in its original context in John to apply to all ethnic Jews and then applied

this interpretation to contemporaneous Jews. This analysis will inform the way contemporary scholars engage the brutal history of the Fourth Gospel's use, as they seek to be faithful to the original situational text and mindful of the way the text has been exploited. Whether or not scholars agree with defamatory uses of the Gospel of John, the importance of understanding the particularities of such uses cannot be disregarded in this age of fundamentalism.

Fibrin Deposition in the Malaria-Infected Placenta: A Disruption in the Balance Between Coagulation and Fibrinolysis
Lauren Kelly – CURO Scholar
Dr. Julie Moore, Department of Infectious Diseases, University of Georgia

Placental malaria (PM) is characterized by accumulation of *Plasmodium falciparum*-infected red blood cells in the human placenta. This leads to maternal anemia and poor fetal outcome, including low birth weight and possibly perinatal death. Primigravidae are more susceptible to the devastating consequences of PM, suggesting the presence of gravidity-dependent immunological resistance among malaria-exposed women. Common features of PM include monocyte infiltration to the maternal blood space and excessive fibrin deposition, an end-product of blood coagulation. The immune factors involved in the recruitment and activation of maternal immune cells to the placenta and their role in local hyper-coagulation are poorly understood. It is hypothesized that syncytiotrophoblasts, fetal cells facing the maternal blood circulation, secrete these cell mediators as well as pro-coagulants or anti-fibrinolytics, resulting in the influx of maternal immune cells and clotting/fibrin accumulation. To address this hypothesis, placental plasma samples were collected in malaria-endemic western Kenya and stratified according to PM status and gravidity. The results reveal higher levels of soluble immune factor expression in PM+ primigravidae compared to multigravidae. The levels of plasminogen activator inhibitor-1 (PAI-1), which inhibits fibrin degradation, and Tissue Factor Pathway Inhibitor (TFPI), which suppresses clotting, are being evaluated by ELISA. Finally, semi-quantitative estimation of fibrin and PAI-1 protein by western blot is also being performed. Elucidation of which soluble immune and coagulation factors are expressed during PM will contribute to understanding the immunological mechanisms occurring at the materno-fetal interface of the malaria-infected placenta.

String Theory and Its Mathematics
Tyler Kelly – CURO Summer Fellow
Dr. Elham Izadi, Department of Mathematics, University of Georgia

When working in String theory, Kaluza-Klein theory demonstrates six extra dimensions in addition to our typical 3 spatial and one time dimension are necessary. In relation to our current scope of the real world, what do these six extra dimensions look like? The criteria given for these extra dimensions constitute a Calabi-Yau shape, a geometric object that has had its own history throughout the history of mathematics. We will explore these questions, the Calabi-Yau space's time in the limelight, its properties and algebro-geometric characteristics.

Mandatory Health Insurance: A Necessary Change
Erin Kennedy – Roosevelt@UGA
Dr. Audrey Haynes, Department of Political Science, University of Georgia

According to the latest reports by the U. S. Census Bureau, 45.7 million individuals in the United States are uninsured. Despite current government programs, 31.6 percent of persons below the poverty level lack insurance, and 24.5 percent of households with an annual income less than $25,000 have no health insurance. A large uninsured population creates numerous problems, including higher premature mortality rates for the uninsured, higher health insurance premiums for the insured, and financial and logistical pressure placed on the healthcare industry. After researching domestic and foreign health care policies, current problems, and purposed solutions, it has become clear that a new approach must be taken. The United States

must implement a policy requiring all residents of the United States to purchase health insurance operating on a bracketed system established for addressing the needs of the poor and under resourced. Universal mandatory health insurance will be costly, but the long-term benefits of this policy will far outweigh the initial costs. The socioeconomic benefits include the potential to lower health insurance premiums, improve the quality of care received by the previously uninsured, increase the health and longevity of the populous, and even increase economic productivity.

Chicken Pedigree Flocks are the Ultimate Source of *Salmonella* Contaminating Poultry Meat

Akshita Khetarpal, Chris Cornelison, Mopelola Oluwadeire, Puja Bharucha, Zuhha Ashraf, Amyn Lakhani, and Hunter Faircloth
Dr. John Maurer, Department of Population Health, University of Georgia

Salmonella is one of the leading contaminants found in the poultry products, which causes illnesses in many consumers of meat and eggs throughout the world. In the poultry industry, *Salmonella* is challenging to eradicate and control due to its ability to be transmitted horizontally, which is direct or indirect contact with pathogenic environment, or vertically, which is the spread of *Salmonella* from parent breeder birds to the next generation of birds. We believe that chicken pedigree flocks are the ultimate source of *Salmonella* contaminating poultry products. *Salmonella* was isolated from primary breeder, broiler breeder chicken farms (reproductively active birds), and broiler chicken farms (meat birds). One of the methods used to test this hypothesis was running pulse field gel electrophoresis (PFGE) to relate *Salmonella* isolates from chicken carcass to the primary breeder farms. CDC uses PFGE as the standard protocol to recognize outbreaks by matching DNA fingerprints. Upon running PFGE, it was observed that *Salmonella* strains from chicken carcasses, broiler farms, or broiler breeder farms matched strains from primary breeder. Vertical transmission of specific *Salmonella serovar* (Enteritidis, Heidelberg, and Kentucky) was observed between the primary breeder farm and chicken carcasses, and broiler breeder farms. On the other hand, we also observed some *Salmonella* strains that did not match to the primary breeder level. It is important to control *Salmonella* through vaccination at the primary breeder level and broiler breeder level to prevent chicken carcasses contamination from *Salmonella*.

Imaging of Seizure-Induced Ca2+ Waves in Developing Zebrafish

Jung Kim – CURO Summer Fellow
Dr. Andrew T. Sornborger, Department of Mathematics and Dr. James D. Lauderdale, Departments of Cellular Biology, University of Georgia

Over 50 million people suffer from epilepsy worldwide. Seizures in two thirds of all patients have no known cause, and seizure is the second leading cause of disability and death of children under the age of fourteen. Current evidence indicates that seizures in children differ from those in adults. Larval zebrafish are a good model organism to study seizures *in vivo* due to 1) their transparent body, 2) their fast growth during embryonic development, 3) the availability of chemicals known to artificially provoke seizure, and 4) their genetic proximity to humans as vertebrates. In this study, I tested the hypothesis that the pattern of seizure activity changes in zebrafish as a function of brain development. Zebrafish transgenic for a genetically encoded calcium (Ca^{2+}) indicator, known as *cameleon*, were utilized to measure Ca^{2+} concentration changes in neurons. Changes in Ca^{2+} concentration can be used as an indicator of neural activity because synaptic events are triggered by calcium inflow into the neurons. A statistical technique called the Statistical Optimization for the Analysis of Ratiometric Signals (SOARS) developed by our laboratory was used to detect and analyze seizure-induced Ca^{2+} waves in the central nervous system (CNS). Seizure was provoked by pentylenetetrazol (PTZ), and zebrafish at one to eight days post-fertilization were imaged using confocal microscopy. Analysis of my imaging data revealed that 1) the magnitude of Ca^{2+} waves

increased as the brain became more complex, and 2) the duration and frequency of waves changed as the brain matured.

Exercise and Cognition in Overweight Children

Anne Kimball
Dr. Jennifer McDowell, Department of Psychology, University of Georgia

Evidence has suggested that exercise can have a variety of beneficial effects on cognition. This study investigates whether exercise benefits children's executive control (EC). EC constitutes supervisory control of cognitive functions, including inhibition and allocation of attention and memory. The participants were 25 sedentary, overweight (BMI $\geq 85^{th}$ percentile) children ages 8-11 years old. Subjects were randomly placed into either an attention control group, which engaged in instructor-led sedentary activities, or an exercise intervention group, which participated in aerobic training for 40 minutes/day, 5 days/week for 9 months. An antisaccade task and Eriksen flanker task were used as behavioral measures of EC and were tested at the beginning of the intervention and at 9 weeks. Antisaccade tasks involve the suppression of a prepotent visual response and generation of eye movement towards the mirror-image unmarked location. The flanker task requires suppression of interfering responses and selective attention to a central target. Because antisaccade and flanker tasks are relatively well-understood measurements of EC, observing changes in antisaccade and flanker performance over time for both groups could provide evidence for an effect of exercise on cognition. It is hypothesized that the exercise group will demonstrate increased performance on both antisaccade and flanker tasks as compared to the control group. By providing evidence for the positive effects of exercise on cognition, this study would support the implementation of aerobic exercise programs in schools so that children in America would be healthier, both physically and mentally.

Cap and Trade: A Comprehensive Solution to Georgia's Water Problem

Jarred Klorfein – Roosevelt@UGA
Dr. Todd Rasmussen, Department of Water & Soil Resources, University of Georgia

The state of Georgia suffers from extremely low stream flows, precipitation, and soil moisture, otherwise defined as severe drought. These water shortages create tremendous economic, environmental, and social costs for Georgia. Such climatic patterns are not new; however, increasing demand from rapid population growth will soon exacerbate the consequences of the water crisis. Yet, the state historically intervenes only in times of severe drought and water shortages. These regulatory practices are reactive in nature and fail to offer long-term solutions to the problem. To resolve this dilemma, the Georgia Assembly should enact legislation establishing a cap-and-trade program for water distribution. This system would reduce demand by allocating limited amounts of water to individuals or corporations based on the value of its use. The state government would allocate water credits to pre-established water utilities for distribution. Individuals or corporations may then buy or sell units of water based on need and perceived value of each unit. A market-based approach remedies traditional complications seen in past attempts at regulatory allocations. Using previously established water management districts, water consumption credits would be allocated based on current population assessments as well as previous water consumption. Creating a market through which credits could be bought and sold would insure that credits would be redistributed to their highest valued use. Georgia has yet to implement such a reform, as any water restriction may result in movement of valuable companies towards neighboring states. Two case studies of cap-and-trade mechanisms were also used. As seen in other market reforms, cap-and-trade will alleviate the impacts of current and future water shortages while ensuring that resources are efficiently allocated. Water-move, an Australian based initiative, has been used to create a water market. This has been effective in drought mitigation. In addition, lessons can be

learned from U.S. SO2 cap-and-trade practices, which have significantly reduced harmful emissions.

Detuning London: Street Musicians and the Noise Suppression Campaign in Victorian London

Noah Koon – CURO Scholar
Dr. Steven Soper, Department of History, University of Georgia

A combination of street musicians, balladeers, hawkers and industrial workshops sometimes made life in Victorian London unbearable. Many notable artists and writers expressed their distaste for the noises of the streets in their diaries, books, and art; claiming that it impeded their work and endangered the health of those whose illnesses were treated at home. Others defended street musicians and the like as a cheap and delightful source of entertainment and work for the poor. Many historians have chosen to reflect on this subject with its climax being the 1864 passing of the Metropolitan Police Act. However, the post-1864 debate reveals a larger class conflict and a convergence of authority directed at shaping lower class behavior and order. An analysis of the post-1864 life of the street musician offers a great deal of insight into changing social relations and power structures in the late Victorian era as well as insight into Victorian perceptions of ownership, privacy, immigration, and taste.

Manicures: Not Just Paying for Pretty Nails

Jillian Kornau
Dr. Katalin Medvedev, Department of Textiles, Merchandising & Interiors, University of Georgia

Dress is a major form of nonverbal communication. It is defined as any modification or supplementation to the body (Eicher, Evenson & Lutz, 2008). Manicuring falls under both of these categories: the trimming and shaping of nails is a modification of the body; the addition of color and false fingernails is a supplementation to the body. American women from all social classes pamper themselves by purchasing manicures. While for some women manicures are a weekly routine, for others manicures are a rare indulgence. A woman's nails convey a lot of information. For example, they can suggest her social standing and indicate the type of work she does on a daily basis. The purpose of this paper is to explore the seemingly "mundane," gendered practice of manicures in a scholarly fashion and investigate the emotional and therapeutic benefits women get from it. I provide background information about the practice of manicures and discuss the central role of the manicurist in the process. Many manicurists consider themselves emotional laborers because they are not only supposed to beautify the hands and nails of their clients, but are expected to provide emotional relief to their customers as well. I also investigate why and how manicures are being used as a form of health treatment for the elderly and women with Alzheimer's disease and dementia. Many elderly women consider manicures their only form of beauty therapy. An additional bonus is that, during a manicure, elderly women are touched by the bare hands of the beauty therapist. This is very important because caring human touch is often missing from elderly women's lives. Manicures are part of the hospital treatment of patients of Alzheimer's disease and dementia because this repetitive activity provides them not only with a soothing physical sensation but emotional benefits as well.

Transcription Regulation by the Bacteriophage T4 AsiA Protein: AsiA Interactions with the Beta Subunit of RNA Polymerase

Jackie Lastra
Dr. Jeffery Urbauer, Department of Chemistry, University of Georgia

The AsiA protein is a product of the T4 bacteriophage *asiA* gene. AsiA inhibits transcription at early phage promoters and host promoters by binding to the sigma-70 subunit of the host (*Escherichia coli*) RNA polymerase. AsiA alters the special relationship between the sigma-70 subunit and the β-flap, which results in the inability of the polymerase to properly recognize these promoters. Thus, transcription is inhibited. Because the *asiA* gene is, itself, an

early gene, a feedback loop results that prevents the overaccumulation of the AsiA protein. This is important because AsiA is toxic to the host cell. This antibiotic/antimicrobial potential could, therefore be exploited to assist in developing a novel class of antibiotics that mimic, mechanistically, AsiA function. We have localized the β-flap binding site on AsiA to regions near the C-terminal portion of the AsiA molecule using nuclear magnetic resonance (NMR) spectroscopy. Furthermore, we have determined the affinity of AsiA for the β-flap region using surface plasmon resonance (SPR). To define the contributions to affinity of each of the amino acids in the binding region, alanine scanning site-directed mutagenesis was employed. Each of the amino acids in the putative β-flap binding region was mutated to alanine to assess the contribution of that amino acid side chain to affinity for the β-flap. The structural integrities of the mutants were confirmed using NMR. The studies to measure the affinities of these mutants for the β-flap are ongoing. Overall, our results will be integral to a comprehensive, general understanding of transcription regulation.

Biopsychosocial Factors and Healthcare Utilization in Children With Non-Cardiac Chest Pain

Jennifer Lee – CURO Summer Fellow
Dr. Ronald Blount, Department of Psychology, University of Georgia

Chest pain is a frequent reason for referral to pediatric cardiologists. However, 95% of these children experience pain that is non-cardiac in origin. In the vast majority of these instances, the cause of the pain is idiopathic. Currently, the little research that has been done in this area suggests that psychosocial factors may play a prominent role in the etiology, severity, and maintenance of this condition. The purpose of this ongoing study is to delineate factors particular to children and adolescents who present in a cardiac specialty clinic with non-cardiac chest pain (NCCP) versus those who present with innocent murmurs (IM). Participants include individuals 8 to18 years old who were referred to a pediatric cardiology clinic for a first time evaluation of symptoms of chest pain or heart murmur. Only patients with a diagnosis of NCCP or IM were retained in the study. Data were collected in three cardiology clinics as part of the patient's medical work-up. Measures of pain, somatic symptoms, psychological symptoms, and healthcare utilization were administered to the children and their parents. Preliminary results indicate that children with NCCP experience significantly more somatic symptoms, anxiety, and depression than children with IM. They also experience greater functional disability due to their symptoms. Children with NCCP also had significantly higher rates of healthcare utilization in the past year than those with IM. Applications for this research include clarifying the contribution of these psychosocial factors to inform efficacious treatment, decrease familial distress, and decrease health care utilization.

Georgia's Forest Biomass and the 2007 Energy Bill: What's Wrong and How to Fix It

Jonathan Lee – Roosevelt@UGA
Dr. Robert Izlar, Department of Forest Resources Management/Renewable Natural Resources Policy, University of Georgia

The Energy Independence and Security Act of 2007 (EISA) reduces Georgia's ability to economically manufacture renewable liquid fuel from forest biomass. Georgia ranks among the top of all states in its possession of obtainable forest biomass, but the Act's definition of "renewable biomass" excludes the majority of Georgia forestland from being used to manufacture transportation fuel. The purpose of this research is to suggest and support a definition that would better enable Georgia to establish a viable renewable fuels industry. This definition should be a broader, more scientific definition which includes any organic material available on a renewable, recurring basis. This definition would likely incorporate appropriate federal lands and all private forestland in compliance with current Georgia's Best Management Practices for timber harvest. Naturally regenerated hardwoods and plantation-grown pines would likely be included regardless of when they were last harvested. With this

broad renewable biomass definition, nearly 24 million forested acres of Georgia's 34 million acre total land base would qualify for use in the production of transportation fuel under EISA. Research is based on literature including congressional testimony, trade association position statements, personal interviews, and newspaper articles. Forest inventory reports and scientific journals are included when appropriate. The research intends to show that current law will not have the long-term effect of increasing the size of Georgia's forest cover, jeopardizes the establishment of a renewable fuels industry in the state, and, finally, that its language is based on a precautionary, yet misguided, philosophy of environmental protection.

The Importance of Specific Genes within the Cobalamin Region of Mycobacterium Tuberculosis and Their Effect on Virulence

Natasha Lee
Dr. Russell Karls, Department of Infectious Diseases, University of Georgia

Tuberculosis (TB) is an infectious disease caused by the bacillus Mycobacterium tuberculosis. In 2005, 9.2 million people were diagnosed with the disease and 1.7 million deaths were recorded. The World Health Organization estimates that one-third of the world's population is infected with TB, and 10% of those infected have the risk of developing the active form. In order to successfully prevent, diagnose, and treat this disease, it is imperative to understand the mechanisms this pathogen uses to survive in a human host. Cobalamins, such as vitamin B12, are cofactors in many reactions including DNA synthesis, protein synthesis, and fat and carbohydrate metabolism. M. tuberculosis contains a cluster of genes that are thought to be responsible for production of cobalamin. It is hypothesized that this cobalamin synthesis region is advantageous towards the survival of this pathogen in the human host. This biosynthetic region contains additional genes that are known to contribute to virulence. To determine if cobalamin is involved in virulence, a mutant of M. tuberculosis strain Erdman lacking the cobalamin cluster has been constructed. To clarify which genes are required for cobalamin synthesis, several plasmids carrying different parts of the deleted region will be cloned and transformed into the mutant. Progress towards the construction of these plasmids containing the specific cobalamin regions will be presented. If specific genes can be discovered to affect virulence and pathogen survival, then it is possible to better diagnose and treat tuberculosis.

Poetic Pedagogy: Teaching Creative Writing at Coile Middle School

Laura Leidner
Dr. Melisa Cahnmann-Taylor, Department of Language & Literacy Education, University of Georgia

According to Cahnmann (2006, 2008), seldom do teachers find opportunities within the mainstream classroom to listen deeply and attentively to the music in students' vernacular uses of language or the creativity and content in their spoken and written words. This research chronicles my experiences as a novice creative writing educator working with eight low-income, dialect speakers of English in the context of an after school middle grades program in Georgia. Following Cahmann's (2006, 2008) use of poetry and Hankins (2003) use of narrative as data in teacher research, a narrative and poetic journal has been constructed, filled with field notes, or what Hankins describes as "heartnotes," which are reflections that document experience, acknowledge personal biases and critically and poetically reflect on those biases. Analysis draws both on students' engagement in the creative writing process as well as the effect narrative and poetry have on my own experiences as a first time creative writing instructor. The narrative and poetical journal documents patterns in students' writing and in my own journaling, specifically, areas of greatest strength, weakness, and noteworthy misunderstandings. Analysis of these patterns will ultimately answer the question of what needs greater instructional emphasis: more traditional literary analysis, poetic and creative writing mechanics or instructor-student empathy

and understanding. Findings discuss "the craft, practice and possibility" (Cahnmann, 2003) of maintaining a creative stance toward English language instruction. A hybrid presentation including poetry and prose will be used to communicate intellectual and emotional conclusions drawn from this teacher-research experience.

Comparative Studies on IDE-Activating Compounds

Marissa Ludley
Dr. Walter Schmidt, Departments of Biochemistry & Molecular Biology, University of Georgia

The insulin-degrading enzyme (IDE) is associated with the clearance of the Aβ-peptide, which is believed to be the neurotoxic agent in Alzheimer's disease. IDE is part of the M16A subfamily along with the yeast enzyme Ste23p that is highly similar in amino acid sequence, having approximately 40% identity. Because of these and other similarities, we hypothesize Ste23p and IDE to have similar enzymatic profiles. To test the hypothesis, the enzymatic activities of the two enzymes and several other proteases were compared and contrasted using a fluorescence-based assay and a panel of eleven IDE activators previously identified by the Schmidt lab. The assay makes use of a synthetic dodecapeptide substrate that is readily cleaved by M16A proteases. This comparison is important for understanding the mechanism of activator action and the specificity toward M16A enzymes, which will impact the development of potential therapeutic strategies for Alzheimer's disease. While some compounds activated both Ste23p and rat IDE, as originally hypothesized, others affected Ste23p and IDE differently. Compounds 4, 8, 9, and 10 were most specific for the M16A proteases, having a limited effect on bovine trypsin and the yeast proteases Rce1p and Ste24p, all of which are unrelated to M16A proteases. Future investigations of the effect of compounds on the activity of human IDE, especially in the context of Aβ as substrate, are now being planned. Since insulin is another substrate of IDE, we also plan to determine the impact of these compounds on modulating insulin degradation. It is our long-term aim to use our specificity data in the development of new compounds that specifically enhance IDE-mediated Aβ degradation over that of insulin so as to minimize non-specific effects associated with an IDE activator-based therapeutic strategy for Alzheimer's disease.

Investigation of the Genetic Basis of Longevity in *Caenorhabtitis elegans* Using Microarray Analysis

John Marshall
Dr. Lance Wells, Department of Biochemistry & Molecular Biology, University of Georgia

Mutations in genes along the insulin-like signaling pathway in *Caenorhabditis elegans* cause the largest lifespan modulations recorded in science. We seek to explain the mechanism behind this phenomenon by documenting gene expression in animals with these mutations via microarray analysis. A population of *C. elegans* with a hypomorph daf-2 gene displays both increased median and maximal lifespan. The daf-2 protein is analogous to the insulin receptor and operates at the beginning of the cascade. The daf-16 gene functions as a downstream suppressor of both categories of lifespan phenotype. O-GlcNAc is a common regulatory post-translational modification to proteins along this pathway, and hypomorphs of the O-GlcNAc cycling enzymes also impact lifespan. The ogt-1 mutation (coding for O-GlcNAc transferase) brings only median lifespan back to wild type, thereby closing the phenotypic gap between the daf-2 mutant and the daf-2; daf-16 double mutant. In this study, RNA extracted from nine-day-old populations of several *C. elegans* strains will be sent off for microarray analysis. This will provide information on how the genes known to influence lifespan are impacting regulation of other nearby genes. In the data, we will be looking for genes which are brought back to wild type expression levels in daf-2; daf-16 mutants but not in daf-2; ogt-1 mutants. Such genes will be prime candidates for the genetic basis of maximal longevity, and understanding their biochemical functions will help indicate the mechanism by which insulin signaling is

modulating lifespan. This study carries implications for any species with the insulin signaling pathway

Perceptions About the Implementation of the Georgia Performance Standards in Mathematics

Jasmine Mathis – CURO Apprentice
Dr. Patricia Wilson, Department of Mathematics & Science Education, University of Georgia

In 2008, the Georgia Department of Education decided to change its high school curriculum from the Quality Core Curriculum to the Georgia Performance Standards (GPS). The Georgia Mathematics Performance Standards combines the previous subjects of Algebra, Geometry, Statistics, Trigonometry, and Pre-Calculus into an intensive four year study sampling from at least three of these subject areas every year. This project was developed to evaluate the views of teachers, parents, and students during the first few years of the Georgia Performance Standard's implementation. The opinions of the teachers, parents, and students have a direct relationship with the success and longevity of the Georgia Mathematics Performance Standards. A series of surveys and interviews will provide an outlet for the stakeholders to express their opinions and a viable way for the perspectives on the implementation of the Georgia Mathematics Performance Standards to be carefully interpreted. This study will help teachers and school district officials to understand what participants think about new curricular innovations and help to improve its implementation.

The Relationship Between Parental Disciplinary Practices and Children's Social and Emotional Competence in Low-Income Families

Megan Matuszak, Brandi Kelley, Melissa Roth, and Rachel Zudekoff
Dr. Tsu-Ming Chiang, Department of Psychology, Georgia College & State University

Parents are influential in providing an environment for their children to develop social and emotional competence starting from an early age. Specifically, how parents regulate children's misbehaviors through disciplinary actions may contribute to children modeling parents' behaviors in interacting with others. At-risk children are distinct in their interpretation and regulation of emotions with characteristics such as withdrawal or externalizing behaviors. Examining the influence of parental disciplinary strategies and the attributions of wrongdoings on at-risk children's outcome behaviors poses important implications for interventions. The study consists of two waves of data collected over 3 years in documenting children's social and emotional development from multiple assessments. Forty-three children, with ages ranging from 37 months to 43 months, from a community Headstart program participated in the study. These children were nominated by their teachers based on various types of social and/or emotional issues displayed in the classrooms. Parents completed a parental survey describing the frequency of various positive and negative behaviors observed at home, along with attributions of these behaviors and the disciplinary strategies used. The results of our study reveal that when a parent chooses disciplinary strategies such as Time Out or Ignoring, and chose not to properly explain the reason for punishment, the child may comply with the punishment but not understand which behavior caused them to be disciplined. The child may internalize these forms of discipline as unreasonable or neglect, resulting in social and/or emotional issues expressed through negative behavior that occur in the classrooms, qualifying them for the study.

***Altered Surfaces*: Fabric Manipulation and Design**

Malorie McCloy
Prof. Clay McLaurin, Department of Fabric Design, University of Georgia

The main focus of my research is fabric manipulation: folding, layering, and stitching of flat fabric to create surfaces with volume, texture, and dimension. I construct fabrics that are made up of small components of manipulated fabric, which combine to form a whole, just as the petals of a flower combine to create something that is more graceful and beautiful than simply the petals themselves. I enjoy working with small components because they allow me to gradually build up a fabric's surface over time, exposing my evolving thought process as I go along. There is a natural sense of movement and energy to these pieces. I find myself balancing a playful aesthetic with rich, sumptuous colors and textures. To further expose the transformative nature of my work, I reinterpret the textural surfaces in a two-dimensional format through drawing and screen-printing. The process is endless, and the excitement lies in that I never quite know what the outcome will be.

Glycan Interactions and the Development and Spread of Cancer Cells

Katherine McGlamry – CURO Summer Fellow
Dr. Michael Tiemeyer, Department of Biochemistry & Molecular Biology, University of Georgia

Signaling through the Notch receptor protein modulates cellular differentiation during normal development and maintenance of stem cell populations. Disruptions in these interactions contribute to the initiation and spread of cancer. For Notch to function correctly, it must be modified with O-linked glycans that begin with a fucose residue. Extension of the Fuc with an N-acetylglucosamine is accomplished by an enzyme called Fringe. In vertebrate tissues, the GlcNAc-Fuc disaccharide is extended with galactose and sialic acid. In *Drosophila*, it has been unknown what happens to the GlcNAc-Fuc disaccharide until recently. We have identified an extension of the GlcNAc-Fuc disaccharide with glucuronic acid. The novel glucuronylated trisaccharide is the dominant O-Fuc glycan in the *Drosophila* embryo. To determine whether this glycan structure participates in Notch signaling, O-linked glycans were isolated from embryos mutant for the Fringe enzyme. Interestingly, the O-Fuc trisaccharide was reduced, but not eliminated by this mutation, indicating that previously unknown Fringe-like activities are present during embryogenesis. This new complexity in Notch signaling may relate to human cancer progression. We are applying our techniques to characterize the diversity of N- and O-linked glycans expressed in pancreatic cancer sample. If indicators of abnormal cell-cell signaling are found, they may serve as early markers for pancreatic cancer. Our pilot studies are focused on fluid harvested from the pancreatic duct of patients with pancreatitis and presumptive pancreatic cancer. Initial efforts indicate the need to determine which markers report pancreatic cell function and not confounding contamination by blood proteins.

A Physical and Enzymological Characterization of Human Neuron Specific Enolase

Jared McKinnon
Dr. John Brewer, Department of Biochemistry & Molecular Biology, University of Georgia

Enolase catalyzes the ninth reaction of glycolysis, the dehydration of 2-phospho-D-glycerate (2-PGA) to phosphoenolpyruvate (PEP). The reverse reaction, a hydration of PEP to 2-PGA, occurs in gluconeogenesis. Magnesium is required for activity. Enolases are generally abundantly expressed, so are major cellular proteins. In addition, three isozymes of enolase exist in vertebrates. Enolase α is ubiquitous through all cells. Enolase β is muscle-specific. Enolase γ (the one with which we are working) is neuron-specific and is referred to as neuron-specific enolase (NSE). Each enolase is a homodimer. The goal of the research is to determine whether or not the subunits operate independently. The human NSE gene supplied, with a C-terminal His-tag attached to facilitate purification, was expressed in *Escherichia coli*. The enzyme has been characterized physically and enzymologically. Two articles describe the enzymological characteristics of human NSE but present no data. This preparation for human NSE is shown to be homogeneous, as expected from previous experiments. The dependences of activity on magnesium, substrate, and potassium chloride concentrations as well as pH were determined. Stopped-flow measurements of the reaction of human NSE with a slowly reacting chromophoric substrate analogue were done. In tris buffer, the reaction exhibits biphasic kinetics. In PIPES, the magnesium-dependence shows two activation constants. These observations are consistent with catalytically significant interactions between the two active sites. Many cellular proteins exist as oligomers and transmission of information (communication) is crucial to the maintenance of life. Study of a simple system of interprotein communication increases understanding of this fundamental process.

The Absence of Term Limits in the Constitution: Motivations of the Framers

Caitlin McLaughlin
Dr. Daniel Kapust, Department of Political Science, University of Georgia

Following the Revolutionary War, the Framers of the American Constitution sought to establish a new government free from the tyranny of monarchy. Arguably, however, their new system enabled the creation of a new aristocracy through perpetual reelection. This paper examines why the Framers, with their great fear of entrenched power, did not include term limits in the Constitution. In studying contemporary American government charters, it appears clear that this decision went against the common practice of the time. Since the absence of controls on reelection was a radical departure from the norm, this paper examines pamphlets from the early American period to highlight the powerful defenses of term limits. Using notes from the Constitutional Convention as well as personal correspondence, it appears that the Framers themselves were divided on the issue. The ultimate decision to exclude term limits was the result of several arguments, including the belief that the possibility of reelection would encourage good service, the view that voters should have the right to elect whomever they please, and the expectation that other institutional safeguards would prevent the development of tyranny. Indeed, the existence of such a multiplicity of rationales is one of the most important results of this study. With the intent of the Framers functioning as common evidence in modern Constitutional jurisprudence, it is critical to gain a clear understanding of their opinions. This paper suggests that elements of the Constitution were not always the result of unanimity of opinion, making the "Framers' intent" difficult to discern.

Improving the Activity of the Heterologously Expressed Soluble Hydrogenase I from *Pyrococcus furiosus* through the Modification of the BW25113 (*E. coli* K12) Genome.

Alice Meagher – CURO Summer Fellow
Dr. Michael Adams, Department of Biochemistry & Molecular Biology, University of Georgia

Hydrogen is the cleanest, most promising fuel alternative for the future. Hydrogen has approximately three times the stored energy per unit mass as gasoline and can be biologically produced in a carbon neutral reaction, releasing only water as a byproduct. However, the renewable synthesis of hydrogen is currently under-developed and inefficient. *Pyrococcus furiosus,* a hyperthermophilic archaeon, produces a soluble four-subunit hydrogenase enzyme, called soluble hydrogenase I, that metabolizes hydrogen reversibly *in vitro*. To engineer modified forms of this enzyme with tailored catalytic activity and electron donor specificity, we needed to express an active recombinant hydrogenase in a model organism such as *E. coli*. We transformed four plasmids, containing the 13 necessary structural and processing genes, into *E. coli* to enable the expression of recombinant soluble hydrogenase I from *P. furiosus* (USA patent 61/005,383). We are now trying to enhance this specific activity of our recombinant hydrogenase. It is possible that *E. coli*'s native hydrogenase enzymes interfere with the functionality of our recombinant hydrogenase. We hope that by removing the genes associated with native *E. coli* hydrogenases, we will have a clearer background in which to express our recombinant hydrogenase. The future commercial production of hydrogen depends upon our ability to synthesize recombinant hydrogenase more efficiently. Thus, we hope that we can preserve the environment and create a more fuel-efficient society by improving our recombinant enzyme and making hydrogen a realistic fuel alternative.

Food for Thought: A Comprehensive Overhaul of American Food Aid Policy

Catherine Mencher – Roosevelt@UGA
Dr. Stacey Mitchell, Department of International Affairs, University of Georgia

In 2008, global food prices nearly doubled from the year before. Already, hunger kills more people annually than AIDS, malaria, and tuberculosis combined. Despite U.S. efforts aimed at resolving global food insecurity, the inefficiencies of the United States' food aid programs actually compound the problem. Currently, U.S. food aid constitutes nearly two thirds of worldwide food donations, yet roughly 60 percent of food aid appropriations are misspent on domestic subsidies. From a qualitative analysis of historical and economic data provided by United States Department of Agriculture and United States Agency for International Development budgets, the United Nations World Food Programme, and various non-governmental organizations, this study proposes three U.S. food aid reforms: (1) that food aid programs be streamlined and moved under the jurisdiction of an Office of Food Security, whose mandate emphasizes the agricultural development of the recipient country; (2) that those aspects of food aid programs solely benefiting influential U.S. constituencies be eliminated or reduced; and (3) that a food security database be created and made accessible to food aid recipients and stakeholders, allowing for a more cohesive, country-specific approach to hunger. This study contends these improvements will benefit the U.S by lowering U.S. taxpayers' long and short-term American aid costs, and by increasing global security through the enhancement of recipient governments' legitimacy.

Thermal Adaptation and Substrate Limitation of Heterotrophic Soil Microorganisms

Calley Mersmann
Dr. Mark Bradford, Odum School of Ecology, University of Georgia

Heterotrophic microorganisms decompose stores of soil organic carbon and, as a consequence,

release carbon dioxide to the atmosphere. Although, in the short-term, microbial respiration rates increase in response to increasing temperatures, the effect of long-term temperature increases on respiration rates remains uncertain. Due to mechanisms such as evolutionary trade-offs in enzyme function and shifting community structure, it is expected that mass specific respiration (R_{mass}) rates will decrease as soil microbe communities adapt to higher temperature regimes. In order to test this potential, we used a laboratory microcosm approach to impose two thermal regimes (constant 12°C or 28°C) on twelve soil samples for 84 days. Additional carbon in the form of glucose was added weekly to one replicate of each soil to account for the possibility of substrate limitation masking the difference in R_{mass} between the two incubation temperatures. To determine the R_{mass} of the soil microbes, we measured the amount of carbon dioxide produced by each soil sample, using assay methods similar to those used in animal, plant, and microbial thermal adaptation studies. Data are being analyzed to test the hypothesis that at intermediate temperatures R_{mass} will be greatest for the 12°C experimentally incubated soils, and lowest for the 28°C soils, indicating thermal adaptation of microbial respiration. Because the soil ecology community currently dismisses this thermal adaptation relationship, conventional thinking will be challenged if results are consistent with the hypothesis. Additionally, this research is necessary to not only more fully understand microbial respiration responses to changing temperatures but also to more accurately predict possible feedbacks between microbial respiration and climate change.

Determining Genes Required for Virulence in the Opportunistic Intracellular Pathogen *Rhodococcus equi*

Jessica Miller
Dr. Mary Hondalus, Department of Infectious Diseases, University of Georgia

The facultative intracellular bacterium *Rhodococcus equi* (*R. equi*) causes severe, pyogranulomatous pneumonia in neonatal foals, and is a life-threatening pathogen of immunocompromised humans. Virulence of *R. equi* depends on the presence of an ~81Kb plasmid, harboring a ~27.5Kb pathogenicity island (PI) containing several ORFs, including those of a novel family of surface-localized and secreted proteins of unknown function termed the virulence associated proteins (VapACDEFGHI). VapA is essential for bacterial growth in *in vitro* grown macrophages and for bacterial survival in a SCID mouse *R. equi in vivo* infection model. However, VapA alone is not sufficient for virulence, as expression of vapA in a plasmid-cured strain does not restore the virulence phenotype. Determining the identity and location of additional plasmid-encoded virulence genes is the focus of the present study. Our recent data have revealed that these other virulence determinants lie within the PI. For complementation analysis, we have used an avirulent plasmid-cured strain of *R. equi* as a vehicle to express vapA along with various combinations of PI genes. Examination of the intracellular growth phenotypes of the latter recombinants, seen through macrophage infection experiments using the complemented strains, has implicated a potential virulence role for 3 genes, orfs 5, 6, and 7 respectively. In addition, construction and virulence analysis of various unmarked gene deletion strains is underway. The deletion of the potential virulence factors will utilize homologous recombination, employing a single-crossover intermediate step followed by fluorocytosine counter-selection. The combination of complementation and deletion studies will determine the complete set of PI virulence factors.

Ambient Gender Cue Vigilance in Choosing College Majors

David Mitchell – CURO Apprentice
and Christina Smith
Dr. Victoria Plaut, Department of Psychology, University of Georgia

Recent research shows that the broadcasting of masculine stereotypes may underlie the lack of women's participation in the field of computer science. This process has not been tested,

however, in real world learning environments, a limitation addressed in the current study. Whereas previous research used worded descriptions of fictitious settings, the present research examined reactions to real educational environments, via pictures of campus buildings, classrooms, hallways, common areas, and offices. The goal of the study was to gauge reactions to physical environments housing traditionally male-dominated (Computer Science), female-dominated (Education), and more gender-neutral (Business, Journalism) majors. Twenty-nine female and twenty-three male University of Georgia first year students with undeclared majors participated in the study. They first rated their interest in ten distinct career paths. They then viewed unlabeled pictures taken in buildings housing the four majors. Following each set of pictures, participants answered questions concerning their perceptions of social fit with the environment, the desirability of the environment, the masculinity/femininity of the environment, and likelihood of spending their college years in the environment. Results did not affirm the hypothesized gender difference in reactions to the four environments. The results did reveal, however, significant correlations of perceptions of masculinity/femininity with the other ratings for each of the four disciplines for women but not for men. This suggests that women's perception of gender cues communicated by a physical environment may play a significant role in women's motivation to join that environment. Theoretical and practical implications are discussed.

Analysis of Phospholipids in Neuronal Tissue Using Electrospray Ionization-Mass Spectrometry

Prashant Monian – CURO Scholar
Dr. Brian Cummings, Department of Pharmaceutical & Biomedical Sciences, University of Georgia

Phospholipids are an important constituent of all cell membranes, and are thought to play key roles in several physiological processes. This research focuses on the use of electrospray ionization-mass spectrometry (ESI-MS) in studying alterations in the phospholipid profiles of neuronal cells in response to different kinds of stress. First, the effects of cocaine withdrawal on the expression of glycerophospholipids in rat brain were studied. For the first time, differences in the expression of phospholipids between different areas of the rat brain were determined by ESI-MS. Withdrawal from cocaine appeared to effect expression of specific phospholipids in a site specific manner, with most of the changes taking place in the hippocampus, the region generally associated with long term memory and spatial navigation. This may explain the long term neuroadaptation associated with drug use. Secondly, alterations in phospholipid and fatty acid lipid profiles in primary neocortical cells during oxidant-induced cell injury were studied. Oxidant-induced alterations in phospholipid composition can lead to decreases in membrane integrity, cell injury and even death. Neurons are especially vulnerable to lipid peroxidation. Treatment with the oxidants hydrogen peroxide (H_2O_2) and *tert*-butylhydroperoxide (TBHP) was found to increase the abundance of phospholipids containing polyunsaturated fatty acids, but had minimal affect on those containing mono- or di-unsaturated fatty acids. In addition, Group IV and VI Phospholipase A_2 (PLA_2) were found to have differential roles in oxidant-induced neural cell injury based on the use of the group specific inhibitors, methyl arachidonyl fluorophosphonate (MAFP) and bromoenol lactone (BEL) respectively.

Behavioral Changes Following Daily Practice of Saccade Tasks in Schizophrenia

Madison Moore – CURO Scholar, CURO Summer Fellow
Dr. Jennifer McDowell, Department of Psychology, University of Georgia

People with schizophrenia show impairment in tasks requiring executive control, like inhibition. A simple test of inhibition is the antisaccade task, which requires a glance towards the mirror image of a peripheral cue. The goal of this study is to determine how practice on the antisaccade task changes performance on that task and on related tasks known to assess executive control. Participants with schizophrenia and healthy

comparison subjects were assigned a single saccade task to practice daily—*either* antisaccades *or* prosaccades (glances towards a peripheral cue)—over a two-week period. Executive control was evaluated at pre- and post-test using two tasks: an ocular motor delayed response (ODR) task measured changes due to practice on a different, but related, saccade task, and the Wisconsin Card Sorting Test (WCST) evaluated whether changes in executive control could generalize beyond saccade tasks. Preliminary results suggest antisaccade practice resulted in modest antisaccade improvement for both normal and schizophrenia groups. Prosaccade practice did not affect prosaccade performance (due to a ceiling effect in both groups). Over the trials, both antisaccade practice groups showed improved performance on ODR and WCST. The schizophrenia prosaccade practice group, however, performed worse on ODR at post-test. In sum, antisaccade, but not prosaccade, practice resulted in modest improvement in performance on all tasks. This study provides evidence that saccadic performance can be malleable within certain parameters and suggests that practicing executive control tasks may be explored as a means of improving activities of daily living.

Creation of a Transposon Mutant Library in Live Vaccine Strain *Francisella tularensis*

Diana Murro – CURO Scholar
Dr. Russell Karls, Department of Infectious Diseases, University of Georgia

Tularemia is a disease of small animals and humans caused by the bacterium *Francisella tularensis*. The most virulent subspecies to humans is *F. tularensis* subspecies *tularensis*. Due to its highly-infectious nature, this pathogen was classified as a category A agent by the Center for Disease Control and Prevention. The Live Vaccine Strain (LVS) is derived from *F. tularensis* subspecies *holarctica*. LVS is avirulent in humans, but still replicates in macrophages and causes a lethal infection in mice. Therefore, identifying LVS genes that are required for intra-macrophage survival should also aid in efforts to attenuate the category A strain. The transposon Tn5 is a mobile genetic element that inserts into the target DNA with very little site-specificity, resulting in virtually-random transposition. To generate a transposon system that functions in *Francisella* species, a Tn5 transposome was constructed containing the gene encoding green fluorescent protein (GFP) and the gene encoding hygromycin resistance under the control of *Francisella* promoters. Transformation into LVS should result in GFP-expressing transformants resistant to hygromycin. As transposition is a rare event, experiments are underway to optimize transformation into LVS. The optimized conditions should enable the isolation of a large set of transposon mutants which can then be screened for failure to replicate in cultured macrophages. The transposon is engineered to facilitate the identification of its chromosomal location. Identifying the disrupted genes is a first step in understanding the mechanisms by which *F. tularensis* bacteria escape killing by the host.

Development of Alternate Sources of Macronutrients for a Sustainable Algal Biofuel System

Vandana Murty
Dr. Keshav Das, Departments of Biological & Agricultural Engineering, University of Georgia

A major concern for our economy and environment today is the efficient production of alternative fuels. Algae are an attractive, fast growing source of biomass. Microalgae require nitrogen and phosphorus for growth. However, the prices of these currently mined nutrients have more than doubled over the past year alone (P: $252 to $1250/metric ton; N: $277 to $452/metric ton). Poultry litter is a common and inexpensive source for these nutrients. It is composed of most macronutrients and trace elements necessary for optimal plant growth. The approximate percent compositions of nitrogen and phosphorus in a given sample of poultry litter are 3.2% and 1.5%, respectively. The extraction follows previously determined methods. Serial dilutions were done to quantify N and P concentrations. Then 7 strains of microalgae, including *Tetraselmus chuii*, *Dunaliella parva*, *Phaeodactylum tricornutum, Tetraselmus suecica*, *Pleurochrysis carterae*,

and *Dunaliella tertiolecta*, were grown in different concentrations of poultry litter extracts (PLE) with varying N and P content. After inoculating all strains and measuring biomass after daily intervals, the best performing strains and best dilution of PLE will be identified. If PLE is optimized according to turbidity and nutrient content and provided as the nutrient source for tested species of microalgae, it will be the most economically effective and sustainable way to produce alternative fuels (>15,000 gallons of fuel/acre). By extracting the nitrogen and phosphorus from PL and using it to cultivate microalgae to produce biofuels, we will potentially have a technology that is both inexpensive and applicable in many areas.

The Role of Integrin Activation in Increased Gliogenesis of Human Neural Stem Cell Cultures

Muktha Natrajan – CURO Apprentice,
Dr. Steven Stice, Department of Animal & Dairy Science, University of Georgia

Human Neural Stem cells (hNSCs) have the potential to replace brain cells in patients with neurodegenerative disorders and are derived from human embryonic stem cells. Neural cell adhesion and development depend on integrins, which are integral membrane proteins that act as bidirectional signaling molecules. Using integrin activation, hNSCs can adhere to a substrate or implant in the brain to replace degenerated cells. Through activation of integrins, it is hypothesized that manganese will direct cells to a glial fate more rapidly than random differentiation. This study's objective is to obtain an increased rate of gliogenesis due to perturbation of integrin activation, which will result in a more purified glial cell population. To increase the rate of gliogenesis, 0.3 mM $MnCl_2$ differentiation media will be added, and hNSCs will be differentiated for 0, 14, 21, 28, and 35 days on polyornithine and laminin-coated plates. mRNA will be isolated from each treatment using the Qiagen RNeasy kit and cDNA will be synthesized. RT-PCR will determine glial cell gene expression of the following seven genes: GFAP, GLAST, IL6, CD44, CNTFR, Aqp4, and VIM. Immunocytochemistry will be performed by fixing cells in 4% paraformaldehyde and staining using standard immunofluorescence protocols. Antibodies against representative glial proteins will be used. Protocols for differentiating purified populations for future use in cell therapy can be obtained. Ultimately, if the quantity of glial cells in a purified population is known, then patient-specific cells can be generated for the replacement of brain cells in patients with neurodegenerative diseases.

Human Disease and the Kit/KitL Signaling Pathway

Nithya Natrajan – CURO Scholar
Dr. Mary Bedell, Department of Genetics, University of Georgia

Kit ligand (Kitl) is the ligand for the class III receptor tyrosine kinase Kit. In vertebrates, the Kit/Kitl pathway is involved in the development and proliferation of germ cells, melanocytes, and hematopoietic cells. In this pathway, a cell secretes or expresses Kitl, which can then bind Kit on another cell. Upon binding, Kit dimerizes and a reaction cascade is initiated within the cell expressing Kit. This pathway is important in multiple differentiated cell types. Kitl has been shown to be an important cytokine in recruiting and activating mast cells during inflammation. This increased expression of Kitl has been linked to tumor-related inflammation. Kit has also been linked to multiple forms of cancer. Gastrointestinal stromal tumors (GISTs), germ cell seminomas, and acute myeloid leukemia have been linked to constitutive activation of Kit. GISTs, which are mesenchymal neoplasms in the GI tract, are probably the most well-studied diseases with regards to constitutive activation of the Kit/Kitl pathway. Kit has also been found to be over expressed in a number of carcinomas. Possible pharmacological interventions for treating disorders related to the misregulation of Kit or Kitl include inhibitors of Kit or a dominant negative Kit protein. However, these treatments are not effective against all activating mutations in Kit. This pathway and the role of Kit in disease must be examined further so that more effective treatments can be designed.

Changing Places: Examining the Role of Place in Invisible Theater Performance

Kelly Nielsen – CURO Scholar, CURO Summer Fellow
Prof. George Contini, Department of Theatre & Film Studies, University of Georgia

This research focuses on the role of place in invisible theater performances. Invisible theater is a subset of Theater of the Oppressed developed by Augusto Boal in the early 1970s, while he was living in exile in Argentina. Wanting to continue political performances but living under a repressive regime, he and his companions began performing scenes in public places without anyone realizing that a performance was occurring. The scenes address pertinent social issues with the aim of creating dialogue. My research questions how the same invisible theater performance changes when performed in different places. To begin this research I attended the Pedagogy and Theater of the Oppressed Conference, and reviewed a variety of texts, including *Theater of the Oppressed*, *Games for Actors and Non-Actors*, and Boal's auto-biography *Hamlet and the Baker's Son*. I have continued my research by forming a troupe, who have spent the year developing and performing invisible theater scenes. The culmination of the research is a scene addressing domestic violence. This is performed in a variety of places, such as a large corporate shopping center, a small, locally-owned store, a fast-food restaurant, an outdoor setting, and a sports event. Qualitative data are collected through troupe members' journals and recordings of the troupe's post-performance discussions, in which members are asked to address specific questions, such as, "How did you alter your performance to adapt to the environment? What types of technology were present? Did these hinder your attempts to involve audience members?" This research will contribute greatly as there is little research done on this fascinating topic.

The Effects of Fetal Genomic Expression of TNF-aRI and TNF-aRII in *P. chabaudi chabaudi* Complicated Murine Pregnancy

Rachel Nix – CURO Scholar
Dr. Julie Moore, Department of Infectious Diseases, University of Georgia

Malaria is known to cause complications during pregnancy, including low birth weight, anemia, high-density parasitemia, and spontaneous abortion, greatly contributing to the morbidity and mortality of the disease for both mothers and babies. It is known that immune response to the disease significantly contributes to the disadvantageous consequences of malaria-complicated pregnancies. Malaria elicits a type 1 cytokine response. This cellular response to infection uses cytokines to control infection. TNF-a, one such cytokine specific only to the Th1 response, has been shown to have detrimental effects on pregnancy. TNF helps to control malaria by lowering parasitemia, but in turn increases severity by activating an inflammatory response. TNF levels increase in response to malaria. This increased TNF expression has been linked to severity, parasitemia, and fever as well as poor infant outcome. There are two TNF-a inhibitors that have been identified, sTNFR-I and sTNFR-II. These inhibitors are cell-surface receptors truncated by proteolytic cleavage of p55TNF-R and p75TNF-R respectively. The soluble receptors and TNF-a interact by forming a complex that exhibits control over TNF levels. This research aims to determine whether maternal TNF expression or fetal TNF expression is responsible to poor infant outcome in malaria-complicated pregnancy. Female mice with double knockout for TNF receptors were bred with control males and infected with *P. chabaudi chabaudi*. The data collected compare fetal outcomes of pups with and without TNF receptors that are born of malaria-infected, TNF-receptor-absent mothers. Viability of pups after a regulated malaria infection during pregnancy is associated with the absence of TNF receptors in the fetus.

Art & Engineering: A Binocular Vision
Brittany Norman
Prof. Martijn van Wagtendonk, Department of Studio Foundations, University of Georgia

A modern-day Leonardo da Vinci, Dutch artist Theo Jansen claims that "the walls between art and engineering exist only in our minds." What happens when we break down these walls and use tools from both the arts and the sciences to bring our ideas into being? To understand, replicate, and enhance aspects of the natural world—these are the goals of both the artist and the inventor. Both are creators who hope to take the matter around them and give it form and give it life. Drawing on studies in computer science, engineering, and mathematics, these artworks will explore the relationships we have with technology, science, nature, and culture, as well as the relationships these have with one another. What happens when both the artwork and the viewer have the ability to sense and respond? Can mathematics be used to create beauty? How can virtual reality be used to develop a more immersive, synaesthetic space that the viewer is able to explore? Just as binocular vision gives us the perception of depth, so an interdisciplinary approach taken from multiple perspectives can provide us with a depth of understanding that allows us to answer questions like these. Artworks in progress include an interactive video projection which responds to the viewer's footsteps, paintings created with fractals, and excursions into the medium of robotics.

Neuromuscular Activation and Movement Kinematics Exhibited During Sit-to-Stand by Multiple Sclerosis Individuals
Sean O'Rourke – CURO Summer Fellow
Dr. Kathy Simpson, Department of Kinesiology, University of Georgia

Multiple sclerosis (MS) is a chronic and progressive inflammatory disease that adversely affects the central nervous system of an estimated 2.5 million people worldwide. Neural sheath degeneration and subsequent plaque formation underlies the physical limitation seen in MS people (MSP). Given the large MSP population, research dedicated to the development of therapeutic programs is necessary. The purpose of this study was to compare the kinematics and muscle activation between MSP and those without MS (nonMSP) during the functionally demanding, sit-to-stand (STS) movement. A sample of 7 MSP with self-reported EDSS scores of ≥ 3 and 6 matched-control nonMSP were tested. Participants first signed the institutionally-approved consent form and proceeded to produce a standardized isometric knee-extensor torque used later for electromyography (EMG) normalization. Five STS trials were then performed, while EMG for the rectus femoris (knee-extensor) muscle and electromagnetically tracked spatial locations of the lower extremities and the lower spine were recorded. Compared to nonMSP, MSP displayed significantly less ($p<0.05$) normalized EMG during the rising phase of STS. Kinematic data showed that MSP display greater trunk flexion and increased trunk flexion velocity during STS. These trunk movement changes increase momentum of the body before liftoff and are most likely movement strategies to compensate for the reduced knee extensor muscle activity found in MSP during STS. These data additionally showed that MSP utilized a greater rise time for the STS movement. The results indicate that these MSP have reduced functional ability to perform STS even with compensatory strategies. A current pre/post study evaluating the functional capacity of MSP after a flexibility or strength training intervention will provide insight regarding the effectiveness of such interventions on enhancing the functional ability of those diagnosed with MS.

Berg Balance Score Correlates to Postural Stability Measures
Alexander Orellana – CURO Apprentice
Dr. Cathleen Brown, Department of Kinesiology, University of Georgia

Falls due to loss of balance are common in individuals with Multiple Sclerosis (MS), but clinical methods of measuring balance may not be sensitive enough to detect subtle deficits. Our purpose was to determine if Berg Balance Scale (BBS) scores were correlated to instrumented postural stability measures in individuals with

Expanded Disability Status Scale (EDSS) scores <6.5. The BBS was performed and scored according to standardized instructions. The NeuroCom SMART Balance Master Sensory Organization Test was used to test static and dynamic balance. Participants underwent the testing procedure twice, only data from the second session were used. Raw ground reaction force data were converted into postural stability measures (center of pressure displacement, velocity, and sway area). Bivariate Pearson correlations (α=0.05) were used to measure relationships between BBS scores and center of pressure (COP) measures. Because 6 correlations were analyzed, the alpha level was adjusted to 0.008 (0.05/6). Male participants (n=4) had a mean age, height, weight, and EDSS of 48.5±6.40 years; 179.39±6.99cm; 90.43±16.83kg; and 2.75±2.60. Females (n=15) were 40.93±11.77 years; 166.25±6.59cm; 78.27±21.28kg; 2.47±1.90. The BBS was significantly and negatively correlated with eyes closed/stable platform COP displacement (r = -.633, P=.006), velocity (r = -.633, P=.006), and sway area (r = -.757, P=.0004). As BBS scores decreased (indicating decreased function), COP displacement, velocity, and sway area increased (indicating worse balance). It appears that BBS is correlated with traditional instrumented postural stability measures in individuals with ambulatory EDSS scores. The BBS appears to be reflective of postural stability in this population.

The Empowerment of Character Expression through the Use of Popular Culture in the Novels of Manuel Puig

Milner Owens – CURO Scholar
Dr. Ángel Nicolás Lucero, Department of Romance Languages, University of Georgia

Manuel Puig's writing has remained a much debated and much studied topic, especially in relation to his own personal political and social views. What is most intriguing about Puig though is his use of foreign popular art and culture to develop ideas and plots that take place in Argentina. Puig's use of literary techniques, in addition to his unusual use of popular art and culture as tools in the elucidation of his characters and plot events, is particularly fascinating. This thesis is an exploration of Puig's use of foreign, particularly American, mass culture art and media, referred to as popular art from here on out, in the development of characters and mindsets in Manuel Puig's first four novels: *La Traición de Rita Hayworth*, *Boquitas Pintadas*, *The Buenos Aires Affair*, and *El Beso de la Mujer Araña.* In these novels, the presence of foreign popular art is very noticeable and plays a key role in the ultimate structure and meaning of the novel, particularly with respect to the presence of a character's "imaginary," what can be deemed as his or her alternate realities, versus the presence of his or her "real" life. The use of the foreign popular art is different in each novel and is highlighted through various literary techniques employed by Puig, particularly in the use of local popular art expressions, which he juxtaposes with that of foreign popular art, creating a type of cross cultural enigmatic, both physically and mentally, setting and character development. Puig focuses on embracing popular culture with a marked lack of artistic snobbery or distance so often associated with other literary minds, which serves as another point of investigation for his utilization of popular culture, especially foreign culture, and his novel use of its artistic impression as a reflective influence on character, plot, and form.

Which Factors Influence the Voting Practices of the Members of the United Kingdom Parliament on Legislation Concerning the Use of Force by the State in Military Interventions?

Julie Patel – CURO Summer Fellow
Dr. Patricia Sullivan, Department of International Affairs, University of Georgia

Military interventions conducted by state powers are not the result of the actions of a single entity or a single factor. There are many factors at different levels of the global system that have influence over a military intervention. Focusing on the role that individuals and governments have in a military intervention will help to better understand the nature and the outcome of that intervention. This study focuses on the state

power of the United Kingdom and its Parliament in the post Cold War setting. There has been previous research done on the voting practices of the political elite of the United States. However, this study focuses on gender, previous military experience, and party membership of the Members of Parliament (MPs) in the United Kingdom to see how those factors impact the voting practices of MPs when it comes to issues of the use of force by the state. In order to conduct the study, research is done on all Parliament sessions and its members since 1991. To investigate the three factors, biographies and profiles of the MPs are researched. Additionally, the voting records of all MPs on pieces of legislation pertaining to the use of force are also studied to see how they voted. The voting records and the three factors are studied together to see if and how they influenced the voting practices of members of Parliament. The primary purpose of the research is to show how focusing on individuals and governments helps to provide a better understanding of how and why a military intervention is conducted by a major power and how it is ended.

Georgia Senate Bills 440 and 441: The Effectiveness of the Adult Criminal System as a Deterrent to Juvenile Recidivism

Nima Patel – Roosevelt@UGA
Dr. Edwin Risler, School of Social Work, University of Georgia

In 1994, the Georgia Legislature passed The Juvenile Justice Reform Act, also known as Georgia Senate Bill 440, in response to the increasing number of crimes committed by youth between the ages of thirteen and seventeen. One specification of the bill requires that youths who commit one of the seven major crimes—including murder, rape, armed robbery, aggravated child molestation, aggravated sodomy, aggravated sexual battery, and voluntary manslaughter with the use of a firearm—are tried in court as adults. Once convicted under Senate Bill 440, Senate Bill 441 imposes a mandatory minimum sentence of ten years in an adult prison without parole. This research will utilize a quasi-experimental design with a nonequivalent control group. Aggregate data from the Georgia Department of Juvenile Justice will be used to analyze the detrimental effect of Senate Bills 440 and 441 on youths. It will focus on rates of recidivism, or the relapse into crime within a year of release from prison, as well as the disproportionate incarceration levels for youths of color compared to white youths, to measure the negative impact of these measures. In order to address these violent crimes, amendment of this legislation by the Georgia legislature, in conjunction with local governments, to prohibit mandatory minimum sentences and incarceration in adult criminal systems for convicted youth is vital. Intensive rehabilitation centers that focus on building education would be a viable alternative. This will mark an effort to reduce the achievement gap between minority and white youths and deter recidivism.

Comparison of Gnt-V Expression in Different Human Carcinoma Cell Lines

Nirzari Patel
Dr. Michael Pierce, Department of Biochemistry & Molecular Biology, University of Georgia

N-acetylglucosaminyltransferase V (GnT-V) is an enzyme that catalyzes β1-6 branching of N-acetylglucosamine on asparagine (N)-linked oligosaccharides (N-glycans) of cell proteins. Increased levels of GnT-V glycan products are associated with increased tumorgenensis and metastatic behavior in many *in vitro* cell lines. Although GnT-V is known to be important in tumor metastases, the expressing of it in different mammary and tumor cells is not fully defined. In this study, the three mammary carcinoma cell lines, MCF-7, MDA, and SK-BR, are utilized to assess the expression of GnT-V. The MCF-10A, (control) a non-cancerous cell line, expresses proteins of interest associated with breast cancer in humans which gives invasiveness properties. Similar to normal human breast epithelial cells, at confluence the MCF-10A cells form dome structures in tissue culture plates and produce mammary spheres in 3D collagen culture. These characteristics make MCF-10A cells a model of choice for breast tumor progression studies. The MCF-7, MDA, and SK-BR carcinogenic cell lines are compared

on the amount of gene expression and product output. MCF 7 tumor cell line is non invasive, while MDA cell line is very invasive, and the SK-BR cell line is invasive with an expression of Her 2/ neu gene. These established cell lines are used for comparative breast cancer research and used to evaluate new therapy approaches *in vitro* prior to *in vivo* testing. In this experiment, western blots are carried out in attempt to understand the expression of GnT-V in comparison with other membrane proteins related to tumor invasiveness. Lectins and antibodies are then applied to the membrane and data are analyzed. At this point, the data are being complied. However, in the future, the results to my data will suggest that GnT-V expression level could serve as a useful tool for tumor analysis in breast cancer.

Directed Differentiation of Neural Progenitor Cells into Glial Progenitor Cells

Tulsi Patel – CURO Scholar
Dr. Steven Stice, Department of Animal & Dairy Science, University of Georgia

Human embryonic stem cells are pluripotent cells that have the potential to differentiate into all cell types found in the human body. The Stice Lab has previously derived neural progenitor (hNP) cells, which can be further differentiated into neurons, from human embryonic stem cell lines. Currently, the media used for cell proliferation comprises neural basal media supplemented with B27, Leukemia Inhibitory Factor, Fibroblast Growth Factor 2, and L-glutamine. All of these are defined components except B27, which is composed of a defined supplement, N2, and other anti-oxidants and factors. To better understand the role of all these factors on neurons, hNP cells were grown in various concentrations of B27 ranging from 0 to 1XB27. 0.1X B27 was sufficient for hNP proliferation. Additionally, RNA analysis data from differentiated neuritis that were proliferated in 0.5X B27 and 0.1X B27 media showed a significantly higher expression of Glial Fibrillary Acidic Protein, a marker used to identify glial cells, when compared to our control cells. These observations indicate that hNP cultures proliferating in lower concentrations of B27 differentiate into glial-like cells. Further experiments to detect GFAP protein levels in these cell cultures will be performed to further support this hypothesis. Glial cells provide support and nutrition for neurons in the central nervous system. Defining a uniform culturing condition for these cells could help understand and cure glial-degenerative diseases like Multiple Sclerosis, Alzheimer's, and Alexander's Disease.

U.S. Involvement in Government Coups in Angola During the Cold War

Hadas Peles
Dr. Tim Cleaveland, Department of History, University of Georgia

In describing the United States as a global Empire of Bases, Chalmers Johnson's writing of the history of U.S. Militarism in *Blowback* and *The Sorrows of Empire* largely ignores U.S.-sponsored covert operations and involvement in the continent of Africa. However, many of the patterns Johnson describes as products of U.S. foreign policy in other parts of the world mirror, reiterate, and reveal much about the worsening relationships between the United States and various African countries. The creation of AFRICOM, the newest of U.S. combatant commands, brings about many questions regarding the future of U.S.-African relations. By exploring the history of U.S. entanglements in various regions in Africa during the Cold War era, largely focusing on Sub-Saharan Africa and Angola, this research will contextualize the current, 21st century challenges of developing and executing U.S. Foreign Policy, especially militarily, in those African regions. Additionally, exploring African newspaper archives from the last nine years yield the causes of the flailing relationships due to past and most current U.S. military endeavors. In particular, this research focuses heavily on the growing controversy of creating a permanent U.S. military presence within the African continent, a land only recently released from the shackles of imperial imprisonment.

"He Can't Do This To Me!" Military Assistance, the Response of Concerned Powers, and Implications for U.S. Aid to Ukraine

Anthony Pelli – Roosevelt@UGA
Dr. Dmitriy Nikonov, Center for International Trade & Security, University of Georgia

The United States currently provides large amounts of military aid to Ukraine in an attempt to modernize its military and make its military forces more compatible with those of NATO. This assistance is also seen as a precursor to Ukraine's eventual NATO accession. There is some concern that the process of binding former Soviet states into tighter military relationships with the United States could worsen the already strained relationship between the U.S. and Russia. While a significant amount of research has focused on the potential costs and benefits of NATO accession for countries in the region, the motivation for giving military aid and the effect the aid has on Russian perceptions has been less thoroughly studied. This paper will examine Soviet arms sales to Egypt in 1955, the Cuban Missile Crisis of 1962, and ongoing American arms transfers to Taiwan in order to assess the relationship between military aid and the perception and actions of concerned major powers. Furthermore, this study disaggregates symbolic (pride, prestige, ideology) from material (concern for the balance of relative power, leverage) concerns and analyzes which factors played a greater role in motivating the actions of the state giving aid the and the response of the "target" state of the aid. Examining these cases reveals that although states are concerned about intangible symbolic factors, it is material factors that are of greater importance in both the giving of aid and response to said aid. Additionally, given this concern with material issues, states are likely to forego a particularly aggressive response to aid that is intended to curb their influence because of the potential consequences of such action. Thus, American military aid to Ukraine is not likely to trigger an overbearing reaction from Russia given the potential consequences of further deteriorations of the U.S.-Russian relationship. This conclusion suggests that it is possible for the United States to use military aid to further its interests in Ukraine and other former Soviet states and focus on the benefits that this aid could have for the nations it is given to (enhancing military professionalism to further democratic consolidation in those states, for instance), rather than on the potential Russian response.

The Ideal Religious Experience

Benjamin Perlow
Dr. Leonard Martin, Department of Psychology, University of Georgia

In previous studies, participating in religious experiences has correlated with overall happiness and an easier time coping with loss. This experiment is attempting to help researchers discover the best type and place for a person to achieve a religious experience and whether religiosity is useful for people. Participants were asked to answer a number of different surveys and open-ended questions. The different surveys used were the Allport and Ross Religious Orientation Scale, Batson's Quest Scale, the NEO-FFI scale, and a religiosity scale designed by Laura B. Koenig, Matt McGue, and William G. Iacono. The different surveys were used to categorize the participants into categories relating to their personalities, religiosity, and background information. The open-ended questions help determine what the participants believe is important in their ideal religious experience and where they can achieve it. The answers to open-ended questions were categorized into five different categories for each question. In the first question, the participants said that in their ideal religious experiences they either experienced a sense of connection, security, positive feelings, clarity, or not possible. In the second question, the participants said that they were most likely to achieve their ideal religious experience anywhere, during crucial events, in a religious place, alone, or with others. These different categories were determined based on common phrasing found in the open-ended questions. The study found that people who truly believe in their religion tend to have higher levels of agreeableness, conscientiousness, and

extraversion. Also, several different dimensions of personality are correlated to the types of ideal religious experiences they receive. For example, people who have intrinsic religious personalities are more likely to have religious experiences where they feel secure, while people who are more extraverted and not neurotic are statistically more likely to have their ideal religious experiences when they are alone.

Comparing Population Size Estimators for Stream Plethodontids

Amanda Perofsky – CURO Scholar
Dr. John Maerz, Department of Wildlife, University of Georgia

Plethodontid salamanders are among the most abundant vertebrates of forested ecosystems in the eastern and northwestern United States. Southern Appalachian streams are hotspots of diversity for semi-aquatic plethodontids; a single stream may include more than a dozen plethodontid species and larval densities as high as 60 per m2. Stream plethodontids are one of the most profuse predators of first and second order streams and are important nutrient sinks because of their remarkable abundance and metabolic efficiency. Despite their considered importance, very little is known about the effects of plethodontids on ecosystem processes, and few studies have estimated absolute abundances of salamander populations. This research will compare abundance estimation of four stream plethodontid species by means of the mark-recapture method. The project will use pre-existing data from a mark-recapture study of these species across six streams at the Coweeta Hydrological Laboratory LTER site. The different categories of mark-recapture models will include closed-population, open-population, and robust design models to demonstrate how different model assumptions can result in a wide range of population estimates. We predict that Pollock's robust design model will be the most appropriate population abundance estimator because of its flexibility to incorporate variation in capture probabilities and to estimate temporary emigration probabilities. Because these abundance estimates will be coupled with data examining the role of plethodontids in nutrient cycling and storage in forest ecosystems, this study will provide a better understanding of the current effects of stream plethodontids on stream processes.

Characterizing RNA-Protein Complexes Involved in Genome Defense in Prokaryotes

Neil Pfister – CURO Scholar, CURO Summer Fellow
Dr. Michael Terns and Dr. Rebecca Terns, Department of Biochemistry & Molecular Biology, University of Georgia

Ribonucleoprotein (RNP) complexes are ubiquitous macromolecular machines involved in most major aspects of cellular function. Various proteins and non-coding ribonucleic acids (ncRNAs) form distinct RNP complexes. We are interested in characterizing novel RNP complexes in *Pyrococcus furiosus*, an organism in which our lab is studying a new class of ncRNAs. These ncRNAs are implicated to function with a set of related proteins in an RNA-based genome defense system in prokaryotes. In order to investigate these hypothetical RNP complexes, I have generated antibodies to putative protein components of these complexes from antigens purified via an *Escherichia coli* expression system. These antibodies are being used for co-immunoprecipitation experiments to identify protein-protein and protein-RNA interactions within the RNP complexes. Once a basic understanding of the RNP complexes is attained, functional studies will be expedited. This research will be used as a framework for manipulation of this biological system for the design of novel nucleic acid-based antibiotics as well as for experimental gene manipulation.

The Role of Microtubules in the Degradation of Hirano Bodies

Cleveland Piggott
Dr. Marcus Fechheimer and Dr. Ruth Furukawa, Department of Cellular Biology, University of Georgia

Hirano bodies are intracellular, paracrystalline, actin-rich structures that are most commonly found in the autopsied brains of humans

suffering from neurodegenerative diseases. Thus, their physiological role(s), beneficial or deleterious, are not well understood, but their possible link to the prevention, cure, and further understanding of neurodegenerative diseases and aging has made their study worthwhile. Recently, an *in vitro* model to induce formation of Hirano bodies in living cells was discovered. This model allows questions regarding the physiological effects, the formation, and degradation of Hirano bodies to be investigated in living cells. The two major ways in which cellular components are degraded in a cell are either through the protein complex known as the proteasome or by the autophagy pathway. Autophagy is a catabolic process of self degradation that requires multiple components in order to function properly. These components must be transported via one of the two major cytoskeletal transport components in a cell, actin or microtubules. We hypothesize that microtubules play a major role in the degradation process of Hirano bodies through autophagy. To test this, Dictyostelium amoeba expressing Hirano bodies were treated with nocodazole, a microtubule depolymerizing drug. These cells were stained after various times of nocodazole exposure and Hirano body size measured. Results showed no difference between Hirano body size with and without nocodazole at all time points. Further experiments will be run using Atg8, an autophagy marker, to distinguish the difference between formation and degradation of Hirano bodies. Once the role of Hirano bodies in neurodegenerative diseases is elucidated, these experiments will help in providing a means to prevent or accelerate the degradation of these highly ordered protein structures.

Imagining Constantinople: Imperial Houses of Worship as Symbols of State Ideology

Stefann Plishka – CURO Scholar, CURO Summer Fellow
Dr. Asen Kirin, Department of Art History, University of Georgia

Architecture physically embodies the priorities and ideologies of the culture in which it was constructed. When built as a function of an imperial government, architecture visually represented the ideological goals of the state. The site selection, scale, and design of a building or complex reflected the overall goals of a state or its ruler. When the Ottoman Empire conquered Constantinople, capital of the Byzantine Empire, its sultans used architectural constructions to manifest the change in imperial rule. Because construction techniques were not as convenient and efficient as in the modern period, carrying out large-scale projects in this period required time, energy, and wealth to sustain the project's completion. Therefore, constructing monumental buildings and complexes became a symbol of the imperial stability, power, and resource availability of the Ottoman Empire. This paper explores the explicit connections between ideology and design at Hagia Sophia (rebuilt in 562 CE by the Byzantine Emperor Justinian I), the complex of Sultan Mehmed II (1463-1470 CE), the Bayezid II mosque (1501-1506 CE), the Suleymaniye complex (1550-1557 CE), and the Sultan Ahmed mosque (1609-1616 CE). These houses of worship show the changing landscape in Constantinople during years in which imperial control of the city shifted from a Christian to an Islamic state. They serve as examples of how rulers, both Byzantine and Islamic, manipulated the urban plan of the city of Constantinople to construct buildings that enhance state ideology and eminence.

Age-Dependent Susceptibility to *Enterobacter sakazakii* Infection in Neonatal CD-1 Mice

Elizabeth Pollak – CURO Apprentice
Dr. Mary Alice Smith, Department of Environmental Health Science, University of Georgia

Premature or low-birth-weight infants are susceptible to infection by the bacterium *Enterobacter sakazakii*, which has been isolated from powdered infant formula. Clinical cases have indicated that younger infants are more susceptible to infection than older infants, sometimes leading to meningitis or death. Our objective was to determine the ages at which neonatal CD-1 mice were most susceptible to infection and at what age, if any, susceptibility

decreased. Neonatal CD-1 mice were orally gavaged with reconstituted powdered infant formula infected with three different doses (10^3, 10^7, and 10^{10} CFU) of *E. sakazakii* to three different age groups: postnatal days (PND) 1.5, 5.5, and 9.5. Mice were sacrificed one week after treatment; blood, liver, cecum, and brain tissue samples were taken. Deaths before time of sacrifice were noted. *E. sakazakii* presence was determined by enrichment and direct culture. Identity confirmation was done by biochemical analysis. *E. sakazakii* was isolated from ceca and liver tissues of animals treated at PND 1.5 more frequently than from PND 5.5 (ceca =18% vs 1%; liver= 14% vs 7%). PND 1.5 neonates were also much more susceptible to infection of the brain (22%) than PND 5.5 (2%). Only the PND 1.5 group showed mortalities (11%) confirming the severity of the infection. PND 9.5 mice did not appear to be susceptible; no *E. sakazakii* was isolated from any tissue at any dose. This research suggests that younger neonates are much more susceptible to *E. sakazakii* infection than older neonates, which is in agreement with reported cases in humans.

Approaches to the Refugee Humanitarian Crisis: An Examination of Refugee Trends and What Promotes Progress

Kathryn Pyne – CURO Summer Fellow
Dr. Jerry Legge, Department of Public Administration & Policy, University of Georgia

With over four million displaced Iraqis, the Iraq refugee crisis is the worst in the world. This project seeks to identify the policies and initiatives that most effectively lowered refugee populations in protracted situations. Using the crisis examples in Myanmar, OPT, Somalia, and Sudan, we gathered statistical data from the UNHCR and constructed time series models to represent the refugee population in each country from 1992-2007. We then connected interruptions in the data trends with actual events that caused them. Upon analysis, we identified the following as factors that impact the refugee population for a specific time period: (A) the coordination of cooperation between the UN, NGOs, local organizations, local government, and the government of surrounding countries is paramount in any refugee crisis; (B) UN resolutions have proven to be extremely effective in decreasing the refugee population for the years to follow when the main countries causing the conflict and creating refugees agree to abide by the terms; (C) peace agreements among warring militias are effective for a short period of time; (D) sanctions and embargos on countries whose government commits human rights violations do not help the conditions for the victims; (E) free and independent media access is necessary in any problem area. These findings are significant contributors to the formulation of Iraq refugee crisis policy. In general, research of migratory movement due to conflict is an extremely important field that will continue to grow due to its irrefutable relevancy to the condition of the global community.

Development of a System to Create Unmarked Mutations in *Mycobacterium tuberculosis*

Akanksha Rajeurs – CURO Apprentice
Dr. Russell Karls, Department of Infectious Diseases, University of Georgia

One third of the world population is infected with *Mycobacterium tuberculosis*. Annually, 7 to 9 million infected individuals suffer from active tuberculosis disease resulting in 1.5 to 2 million deaths. Attenuating *M. tuberculosis* to produce a safe, live vaccine will likely require deletion of multiple chromosomal genes encoding virulence factors. A common system used to delete genes from this bacterium utilizes a specialized transducing phage to mediate the replacement of a mycobacterial gene with an antibiotic resistance marker via homologous recombination. As a vaccine strain encoding multiple antibiotic resistances may lead to transfer of antibiotic resistance genes to other bacteria, we are developing a modified system to enable replacement of any chromosomal gene with a gene cassette that will facilitate the study of the resulting mutants and can also be used to subsequently remove these foreign genes from the chromosome. This is a multi-step process that involves generating a final plasmid with a cassette that has the following features: a hygromycin resistance gene (*hyg*), a gene

encoding green fluorescent protein (*gfp*), and a sucrose counter-selectable gene (*sacB*). The plasmid will also encode an origin of replication for *E. coli* (*oriE*), a bacteriophage lambda *in vitro* packaging site (*cosA*), and a unique site for the DNA restriction enzyme *PacI* for ligation to transducing phage DNA. The details of this system and the intermediate plasmids constructed to date will be presented.

An Analysis of the Effects of Parent-Child Quality of Relationship and Parental Emotion Socialization Practices on Youth Psychosocial Functioning

Nathan Raley – CURO Scholar
Dr. Cynthia Suveg, Department of Psychology, University of Georgia

Understanding influences on children's emotional development has been given much attention by researchers due to the connection between emotional competence and youths' broader psychosocial adjustment. In particular, parents' have been identified as an important contributor to youths' emotional development. A lack of emotional competence has been indicated in various forms of psychopathology (e.g., anxiety, depression; Casey, 1996; Cicchetti et al., 1995; Cole, Michel & O'Donnell-Teti, 1994), which indicates the impact of emotion expression and regulation on people's capability for adaptive functioning. The current study aims to further explore relations between parent emotion socialization practices, parent-child relationship quality, and youth psychosocial functioning. These relations will be analyzed based on both surveys as well as behavioral observations. It is expected that: 1) parental encouraging emotion socialization practices will be positively related to a higher quality parent-child relationship and adaptive child psychosocial functioning, and 2) quality of parent-child relationship will be positively related to adaptive youth psychosocial functioning.

Understanding the Cell Cycle: Cyclin-Dependent Kinase Phosphorylation of Hcm1

Shelina Ramnarine
Dr. Wyatt Anderson, Department of Genetics, University of Georgia

The cell cycle is a series of biochemical events regulated by many molecules, including transcription factors, by which the cell duplicates. Not only is knowledge of the cell cycle critical for understanding normal human development but also when this cycle goes awry, it can lead to illnesses such as cancer and possibly Alzheimer's disease. We purpose that Hcm1, a transcription factor that regulates the expression of genes in other parts of the cell cycle, is phosphorylated by a protein called cyclin-dependent kinase, specifically CDK1. We hypothesized that the inhibition of CDK phosphorylation of Hcm1 alters the percent of cells in the G1 phase of the cell cycle. In a yeast strain where the HCM1 gene was deleted, plasmids containing the WT HCM1 gene (a wild type gene is the naturally occurring gene) were compared with plasmids containing a mutant version in order to test our hypothesis. The results generated by flow cytometry were compared using t-tests to conclude if there was a statistical difference between the four designs being tested. We found that the mutant protein alters the percent of cells in G1. This study should lead to information that may be useful for individuals studying stem cells and cancer because it provides a missing link in understanding the subtleties of the cell cycle.

Steamed Ginger Supplementation Reduces Pain Following Eccentric Exercise-Induced Injury

Al W. Ray, III – CURO Apprentice
Dr. Patrick O'Connor, Department of Kinesiology, University of Georgia

We recently found that 11 days of supplementation with 2 grams of raw, ground ginger reduced arm muscle pain, inflammation and disability induced by eccentric exercise. These effects could plausibly be attributed to compounds in ginger such as gingerols and shogaols that act on vanilloid receptors. The purpose was to determine whether 11 days of

supplementation with ginger treated by steaming, a process known to increase the concentration of shogaols, also influences arm muscle pain, inflammation and disability induced by eccentric exercise. Raw ginger was ground and heated for 3 hours and 15 minutes at 100°C and dried. Ginger and placebo was placed in hypromellose capsules. 40 participants were randomized to consume either 6 ginger or 6 placebo capsules daily for 11 consecutive days. On Day 8, participants performed 18 eccentric actions of the non-dominant elbow flexors at an intensity of 120% of their concentric one-repetition maximum. Before and for 3 days after eccentric exercise, assessments were made of arm volume, arm range-of-motion, isometric strength, pain intensity and perceived effort (RPE) responses to three flexions and extensions of the elbow at 50% of the concentric one-repetition maximum. Post-hoc tests showed that pain and RPE were substantially lower in the ginger group 24-hours after eccentric exercise. Range-of-motion was not influenced by the intervention and small effect size differences in arm volume and isometric strength 24-hours after exercise favored the ginger group but did not reach statistical significance. Supplementation with steamed ginger reduces muscle pain and perceptions of effort the day after eccentric exercise.

On Faith

Joe Reynolds
Dr. Frank Harrison, Department of Philosophy, University of Georgia

What does it mean to have faith in God? To Nicholas of Cusa, a 15th century Cardinal, serious examination of the intellect, love, and hope must be undertaken before faith can be understood. In analyzing each concept and its relation to faith, comparisons shall be made with Plato to highlight similarities among the ancient and medieval traditions. First, it shall be necessary to understand how the intellect enables the individual to be transformed by God. To understand this, a thorough analysis of the nature of the individual must be undertaken, and Plato's characterization of the soul and its desire shall be used as an aide in highlighting similarities. Next, the role of love in enabling the individual to pursue this transformation shall be studied, as well as the role of hope in intensifying this love. After clarifying the previously mentioned concepts, this paper then intends to provide the reader with a proper understanding of a faith in God. In comparing this with a faith not centered on God, the implications of both "life-choices" shall be studied, and, in particular, emphasis shall be placed on how the individual experiences life. In the end, this paper intends to understand why Nicholas of Cusa suggests that by having a 'right' faith, the individual perfects his nature.

Evaluating the Antibody Response to Respiratory Syncytial Virus (RSV) for the Inhibition of the RSV G Protein Interaction with the CX3C Chemokine Receptor

Joseph Rimando – CURO Apprentice, CURO Summer Fellow
Dr. Ralph Tripp, Department of Infectious Diseases, University of Georgia

Respiratory syncytial virus (RSV) is a primary cause of severe lower respiratory illness in infants and children worldwide, also causing substantial disease in the elderly and immune-compromised populations. Previous research has shown that the RSV attachment protein (G protein) interacts with the CX3C chemokine receptor (CX3CR1) during the infection process to modify anti-viral immunity linked to the activities of fractalkine (CX3CL1), the natural ligand of CX3CR1. Evidence suggests that prevention of RSV G protein-CX3CR1 interaction reduces RSV replication, and thus this G protein-CX3CR1 interaction can be targeted as a possible vaccine strategy to mitigate RSV disease pathogenesis. For this study, we are testing different anti-G protein blocking antibodies developed in mice inoculated with RSV to determine if these antibodies can prevent or reduce G protein attachment to CX3CR1. The studies employ flow cytometry to determine the effectiveness of these anti-G antibodies at preventing the interaction between different strains of G protein and CX3CR1 expressed on mutant Chinese hamster ovary (CHO) cells. The preliminary

results suggest that these antibodies significantly reduce G protein's attachment to CX3CR1. Future studies should test the effectiveness of these antibodies in an *in vivo* mouse model. Studies on these anti-G antibodies can potentially lead to the development of the first vaccine for RSV.

Reducing Binge Drinking Among University of Georgia Students

Robert Rosenbleeth – Roosevelt@UGA
Dr. Elaine Weeks, Department of Sociology, University of Georgia

Each year in the United States 1,700 college students aged 18 to 24 die from alcohol-related injuries, including motor-vehicle crashes. Such accidental injuries are the leading cause of death among people 15 to 24 years old. In light of these alarming statistics, many universities, including the University of Georgia, have taken significant steps to reduce binge drinking—drinking five or more drinks within two hours. This study will assess the effectiveness of alcohol-related policy changes that affected UGA students from 2001 to 2007 based on survey data over the same time period and recommend future policy changes to reduce high-risk drinking among UGA students. From 2001 until 2007, Athens-Clarke County significantly increased enforcement of the minimum legal drinking age (MLDA). UGA also increased enforcement of the MLDA on campus, stiffened penalties for students caught violating the MLDA, and increased educational programs targeting underage students and high-risk groups. National College Health Assessment survey data, collected at UGA during the fall semester of odd numbered years, show that these changes are correlated with a large decline in underage drinking rates and a slight decline in binge drinking rates among underage students who report drinking. However, binge drinking remains a significant problem. Many underage students continue to binge. Students of legal age binge drink at even higher rates. And importantly, UGA students continue to perceive a heavy drinking culture. To further combat binge drinking, Athens and UGA must implement a tiered penalties structure based on blood-alcohol content for underage drinking and public drunkenness violations and launch a sustained social norms campaign to combat prevalent misperceptions about UGA's drinking culture.

Natural Prevalence of *Phlebiopsis gigantea* in the Field

Rebecca Roulo
Dr. Sarah Covert, Department of Forest Biotechnology, University of Georgia

The fungus *Heterobasidion annosum* (*Ha*) is the causative agent of annosum root disease, a major destroyer of commercial pine crops in the southeastern United States. Experimentation in Europe has shown the fungus *Phlebiopsis gigantea* (*Pg*) to be an effective biocontrol agent against *Ha* through competition, and *Pg* has been in use as the preferred natural control mechanism in Europe since the 1960s. However, because *Pg* is a wood-rotting pest, the United States Environmental Protection Agency will not approve *Pg* for use in the US until its risks have been fully investigated. Whether or not the physical application of *Pg* to stumps will increase its overall prevalence in the environment is of major concern. Field data addressing this issue were collected from two logging forests in northeastern Georgia, starting in July 2007 and February 2008. Petri dishes were placed on the forest floor to collect airborne spores from sites containing pine stumps treated with *Pg*, water, and controls. Spores were given a week to grow, at which time each dish was analyzed for the presence of *Pg* colonies. Our data have so far shown that the application of *Pg* to stumps does not increase the fungus' overall prevalence in the environment. This is an ongoing project that will aid in the EPA's weighing of the costs and benefits of approving *Pg* for use in the United States.

Characterizing the STE23 ORF
Jarrad Rowse – CURO Scholar
Dr. Walter Schmidt, Department of Biochemistry & Molecular Biology, University of Georgia

According to the latest reports by the U.S. Census Bureau, 45.7 million individuals in the United States are uninsured. Despite current government programs, 31.6 percent of persons below the poverty level lack insurance, and 24.5 percent of households with an annual income less than $25,000 have no health insurance. A large uninsured population creates numerous problems, including higher premature mortality rates for the uninsured, higher health insurance premiums for the insured, and financial and logistical pressure placed on the healthcare industry. After researching domestic and foreign health care policies, current problems, and purposed solutions, it has become clear that a new approach must be taken. The United States must implement a policy requiring all residents of the United States to purchase health insurance operating on a bracketed system established for addressing the needs of the poor and under resourced. Universal mandatory health insurance will be costly, but the long-term benefits of this policy will far outweigh the initial costs. The socioeconomic benefits include the potential to lower health insurance premiums, improve the quality of care received by the previously uninsured, increase the health and longevity of the populous, and even increase economic productivity.

The Physiological Effects of Hirano Bodies in Neuronal Cells Expressing Mutated Tau
Aalok Sanjanwala – CURO Apprentice, CURO Summer Fellow
Dr. Marcus Fechheimer and Dr. Ruth Furukawa, Department of Cellular Biology, University of Georgia

Neurofibrillary tangles (NFTs) are one of the hallmarks of the pathology of Alzheimer's disease (AD). NFTs form when tau hyperphosphorylates, misfolds and then aggregates into paired helical filaments (PHFs). While the mechanism of toxicity due to PHFs in brain is not understood, it is clear that PHFs contribute to cell death. Hirano bodies are paracrystalline, actin-rich cellular inclusions that are more abundant in the autopsied brains of patients with neurodegenerative diseases. The physiological role of Hirano bodies in neurodegenerative disease progression is unknown. It was previously demonstrated that tau localizes into Hirano bodies in brains from patients with neurodegenerative disease.[1] Does the tau protein colocalize with Hirano bodies, and if so, which isoform localizes to Hirano bodies in living cells? Do Hirano bodies protect cells from cell death in the presence of mutated tau? These questions were studied by expressing wild type tau as well as tau modified to mimic hyperphosphorylated tau in wild type, stable GFP expressing, as well as stable Hirano body expressing H4 astroglioma cell lines. Both fetal and adult forms of tau, 352 and 441, respectively, were modeled in this experiment. Immunofluorescence microscopy was used to determine localization of different isoforms of tau in cells with and without Hirano bodies. Preliminary results demonstrated a possibility of localization with Hirano bodies. However, more data are necessary for conclusive results.

1 Galloway, P.G., G. Perry, et al. (1987). "Hirano bodies contain tau protein." Brain Research 403 (2): 337-340.

Borrowed Building/Search Cycle
Ash Sechler
Mr. Mark Callahan, Artistic Director, Ideas for Creative Exploration, University of Georgia

Borrowed Building combines separate photographs of skyscraper windows shaped like internet bricks; they are built/collaged on top of each other to form a single building. I wanted to literalize the process of taking things out of their separated contexts and combining them to create something new. The original URLs of each image are used, so the building's existence is tenuous and is dependent on the individual owners of the pictures. In a way, the building doesn't belong to me; it belongs to the collective photographs' owners. But they also relinquish ownership because they cannot control how their images are used. In *Search Cycle* the viewer/user uses words to search for images from the internet that then appear one at a time in rapid succession (24fps). The images loop, and new images are added once they are downloaded. The search results portray our complex relationships between the words we use and the connotations they carry. Stringing these images together presents a holistic interpretation of how we see the world. They come from an abundance of perspectives and literally blend into each other. The speed of playback is such that afterimages of the previous pictures remain when the next images are displayed (this is how film works). Abstract visual elements are animated, and the viewer gets an impression of a combination of the different images. The synthesis of meanings illustrates a deeper, more whole, and subliminal perspective on the imagery of our culture.

Heart Rate Monitoring is Superior to Accelerometry as an Estimator of Human Energy Expenditure During Physical Activity
Thomas Shaffer
Dr. James Hargrove, Department of Foods & Nutrition, University of Georgia

To prevent gradual, unhealthy body weight gain, the 2005 US Dietary Guidelines advise people to engage in 60 minutes of moderate- to vigorous-intensity activity on most days of the week. Pedometers are popular but do not measure exercise intensity. The present study evaluated whether accelerometers or heart rate monitors were preferable for evaluating intensity of work against gravity (walking on level ground, down stairs, or up stairs). Data were collected anonymously from 12 male and female students who wore accelerometers and heart rate monitors while walking up or down stairs or on level ground at rates of 2-5 miles per hour, as judged with a Garmin 76 global positioning device. Activity data obtained with accelerometers and heart rate monitors both

correlated highly (R2~0.91-0.97) with energy expenditure (MET values) during walking at different rates on level ground. However, while the heart rate monitors clearly detected work done walking on the level ground versus walking upstairs (P<0.01), accelerometers failed to distinguish between walking at the same rate on level ground versus going upstairs (P~0.24). Pedometers and accelerometers are instruments which measure external activity, whereas heart rate monitors provide an internal measurement. Neither pedometers nor the accelerometers used in this study provide reliable information concerning the intensity of work. I conclude that inexpensive heart rate monitors provided a reliable indication of work intensity and are suitable for providing feedback for subjects who wish to meet the goals for intensity and time of physical activity stated in the US Dietary Guidelines.

Male Song Performance Correlates of Reproductive Success and Morphological Characters in the Dark-Eyed Junco (*Junco hyemalis*)

Jeff Shapiro
Dr. Dustin Reichard, Department of Biological Sciences, University of Indiana

Within given populations of sexually reproducing species, there exists a wide range of phenotypic variation. Male diversity is commonly used by females to judge male quality. In songbirds, one such male phenotypic trait is song and in many species male song performance can be used as a predictor of individual quality and subsequently reproductive success. Male Dark-eyed Juncos (*Junco hyemalis*), a small North American songbird, typically sing a single, repeated, high-pitched trill. Due to motor constraints, a male's trill rate constrains its frequency bandwidth. A "high performance" song is one in which the frequency bandwidth approaches the physiological limit for a given trill rate. Therefore, more vigorous males should sing higher performance songs. This study investigates A) if Junco song performance is correlated to reproductive success and B) if Junco song performance is correlated to other phenotypic measures of male quality. We recorded the songs of 65 male Juncos, measured various morphological characters, took blood samples, and tracked their nesting success over the course of the 2008 breeding season. Results are not statistically significant, yet trends suggest that higher performance singers are more physically robust males. Surprisingly though, better singers had lower apparent reproductive success than poor-singing competitors. However, vigorous males are known to have higher actual reproductive success due to more extra-pair fertilizations and therefore we expect results of paternity analysis (pending completion) to demonstrate equal or higher reproductive success for high-performance singers. This result would demonstrate female preference for higher quality song despite poorer parental abilities of those males.

Gender and Developmental Differences in Young Children's Autonomy

Miriam Skiles and Lindsay Jarvis
Dr. Hui-Chin Hsu, Department of Child & Family Development, University of Georgia

Autonomy is characterized by the need to act independently and demonstrate self-governing behavior. Because American culture values independence, parents encourage autonomy and independent exploration in children. Autonomy emerges in toddlerhood around age 2, when children begin to display personal initiative, persistence, and self-regulation. Parents provide greater autonomy support to young children as they mature. Gender differences are likely in children due to differential parental socialization that promotes their sons' autonomy more than their daughters'. This study is aimed to understand gender differences and developmental changes in children's expression of autonomy. Using data from a larger longitudinal research, 20 girls and 20 boys were videotaped during snack time (5-20 minutes) with their mothers at age 2½ and again at age 4. Snack time is a relaxed everyday activity during which the mother and the child are at their maximum comfort level. This would allow an accurate sampling of mother-child interactions.

Both behavioral and verbal measures are used to index autonomy, including: (1) behavioral autonomy: the time the child spends away from the mother to explore the environment, (2) verbal independence: child speech emphasizes the self as unique and autonomous, such as describing internal and/or separate experiences, and (3) verbal assertion: child verbal or nonverbal response to the mother reflecting personal initiative and/or persistence. It is predicted that both genders would show an increase in autonomy from age 2½ to 4. Additionally, boys would demonstrate more autonomous behavior. Findings of this study can benefit parents and educators to promote positive development.

The Chariot Above the Heavens and the Ladder Upon the Earth: An Exploration of Love in the Writings of Plato

Michael Slade
Dr. Frank Harrison, Department of Philosophy, University of Georgia

In the popular imagination, Plato's Socrates is famous for his self-deprecation. Within the Platonic corpus, Socrates claims expertise in only one area: the art of Eros (generally translated as "love"). Despite its anomalous status, Eros is discussed explicitly only twice, in *Phaedrus* and *The Symposium*. The focus of my presentation is the analysis and (hopefully) resolution of the surprisingly different ideologies presented in these two dialogues. Scholars have tended to ignore Plato's internal inconsistency on the topic of Eros, either privileging one dialogue over the other or employing fuzzy generalities to establish their "unity." The disparity is, however, very real. Though both stories end with the apprehension of the Beautiful, the gap between the rational erotic process of *The Symposium* and the "divine madness" of *Phaedrus* is, at best, jarring. Since the Beautiful is closely tied to a host of other key Platonic concepts, including the Good, understanding the ascension to it is hardly trivial. Indeed, exploring the conflict between these visions is to ask the very fundamental question "How does Plato view love, philosophy, and the pinnacle of human existence?" This paper will begin to answer this question by examining the contrasting descriptions (presented through myth and argument) of Eros offered in *Phaedrus* and *The Symposium* and unpacking the philosophical methodology (and, therefore, guide for human conduct) each recommends. The product of this analysis will then be brought into the larger context of Plato's other writings in hope of offering a characterization of his overarching vision and clarifying the role of key concepts in his thought.

Using fMRI and Neuropsychological Tests to Index Brain Function Following a History of Multiple Concussions

Devin Smith – CURO Scholar
Dr. L. Stephen Miller, Department of Psychology, University of Georgia

Concussive injuries occur often in physically trying contact sports such as football and rugby. These injuries can impair neural activity which in turn negatively effects neurocognitive performance. The purpose of this experiment is to use functional MRI (fMRI) to define and track temporal changes in brain function associated with concussive injuries; assess the positive relationship between fMRI defined brain function and neurocognitive performance using traditional neuropsychological tests; and investigate the relationship between fMRI defined brain function and symptom permanence in athletes with a history of multiple concussions. Based on previous research and the extant literature it is expected that athletes with a history of multiple concussive injuries will show specific patterns of fMRI BOLD response that differentiate them from matched controls. It is also expected that participants with a history of multiple concussions will perform significantly worse on the neuropsychological tasks than matched controls. However, the results indicate no such findings; in fact, there were no significant differences between the experimental group and their control counterparts on the neuropsychological testing, fMRI defined brain activation, response time or accuracy on the fMRI tasks. These results could point to greater neuroplasticity amongst young athletes than was

previously thought. It is possible that the tasks used didn't accurately measure traits that are changed after concussive injuries, or the sample size may not be large enough to show statistically significant differences in behavioral or fMRI data. Finally, it is possible that having two to three concussions is below the threshold at which one can expect to see permanent changes.

Senescence and the Y Chromosome
Maren Smith
Dr. Kelly Dyer, Department of Genetics, University of Georgia

Recent research has shown that the Y chromosome has the ability to alter expression of autosomal and X-linked genes (Rice 2001, Lemos et al 2008). Many of the genes influenced by the Y chromosome are known to be involved in pathways that play a role in aging, suggesting a role for the Y chromosome in the aging process. Our research goal is to investigate whether Y chromosome variation causes significant variation in aging. We will create 20 isogenic lines of *Drosophila melanogaster* flies. The lines will be identical for autosomes, X chromosomes, mitochondrial DNA, and cytoplasm. We will use 10 Y chromosomes from an African *D. melanogaster* population and 10 from a North American population. Organisms from these lines will be tested both for longevity and stress resistance to measure effect of the Y chromosome on aging. We will also present data on the level of genetic differentiation between Africa and North American Y chromosomes. The level of genetic differentiation will be used to measure the significance of variation in longevity and stress resistance. Our hypothesis is that there will be significant variation in longevity, stress resistance, or both between the African Y chromosome flies and the North American Y chromosome flies.

The Dehumanization of War and the Female Condition
Sarah Smith
Dr. Hyangsoon Yi, Department of Comparative Literature, University of Georgia

In Korean War literature from the mid-1950s onward, many Korean authors depict the war and the subsequent American occupation as a gendered event. South Korea is typically pictured as a female (often a prostitute for the military) who is invaded, dehumanized and destroyed by the overwhelming masculine force of Western culture. In O Chong-hui's "Chinatown," the author examines the gendered nature of war violence and how it impacts the lives of South Koreans. The ravaged and impoverished city of Inchon in the piece becomes a metaphor for the female body, the actual physical site upon which ideological and cultural warfare is fought. The setting of the war-ravaged port city highlights the female characters' lives and bodies as they are torn apart through childbirth, insanity, sexual violence, and menstruation. O Chong-hui drives the connection between the physical setting of Inchon and the female condition through synesthetic metaphors that immerse the reader in the gritty physicality of the place. The author's heightened awareness of female bodies presents severe consequences—the reduction of women's identities to mere bodies leads to the "bestialization" or dehumanization of the women. O realizes this dehumanization through gruesome animal anecdotes that permeate the story. Ultimately, O makes the connection between the South Korean women's dehumanization through Confucian male supremacy and the devastating dehumanizing effects of war violence on the South Koreans.

Examining the Attitudes of Georgians Toward Universal Health Care and the Consumption Tax
Donald Snyder – CURO Apprentice
Dr. James Bason, Survey Research Center, University of Georgia

Two of the biggest issues in the nation today are healthcare and tax reform. Roughly 47 million Americans are without health insurance, a significant problem politicians and Americans from both sides of the aisle want to fix. The current tax code now exceeds a stupefying 60,000 pages. Some have argued replacing the complex tax code in place today with a simple

sales tax applied at the register whenever someone purchases a good, known as a consumption tax. I created a series of questions on both of these issues that were included in the fall 2008 semester's Georgia Poll, a statewide public opinion survey, to determine the opinions of Georgians on these issues. The results were thus: (1) the approval on the consumption tax items were significantly higher than the rest of the nation, most likely due to the impact of the FairTax and its proponents; (2) the results on the universal health care items were slightly less favorable than national results, most likely because of the large number of Republicans in Georgia, whose party platform disapproves of the measure; and (3) each item was broken down into demographic groups to analyze the statistical significance of answers across groups like gender, party identification, and income. As a result, it seems more likely that the state of Georgia would replace its income and other taxes with a pure consumption tax, and less likely that it would make any reforms that would put it closer to universal health care.

Exclusive Consumption of Sugars as a Biological Means to Convert Lignocellulosic Hydrolysates Effectively

Neeraj Sriram – CURO Summer Fellow
Dr. Mark Eiteman, Biological & Agricultural Engineering, University of Georgia

Scientists are increasingly shifting their focus from tapping food products to using relatively inexpensive substrates such as lignocellulose (plant biomass) to produce bio-ethanol. During fermentation, a single microorganism, specifically *Escherichia coli* (*E. coli*), generally consumes multiple sugars (glucose, xylose, arabinose, glycerol, etc.) released by hydrolysis from lignocellulosic materials in a sequential manner, drawing out the length of the process in producing ethanol. Lack of a microorganism able to ferment efficiently and simultaneously all sugars has been one of the main factors preventing utilization of lignocelluloses. Recently, a novel approach was proposed for the simultaneous conversion of xylose and glucose sugar mixtures into microbial products such as ethanol (Eiteman et al. J. Biol. Eng. 2:3, 2008). This approach involves using multiple strains of *E. coli*, which are each selective in their consumption of a carbon source; for example, one is unable to consume only glucose and the other is unable to consume only xylose. Frequently, however, other sugars, such as arabinose and glycerol, are also found in lignocellulosic hydrolysates. Here, we report results of batch fermentations using an *E. coli* strain KD777, which has mutations in three genes responsible for glucose uptake (*ptsG manZ glk*), which would presumably prevent the metabolism of this carbohydrate. However, in a mixture of xylose and glucose, this strain will consume the xylose first, but will then slowly degrade the glucose. In a mixture of arabinose and glucose, the two sugars are consumed concurrently. In a mixture of glycerol and glucose, glycerol is exclusively consumed. Recently, we have employed RNA microarray technology to determine which genes are expressed in the presence of glucose and xylose compared to in the absence of glucose in order to determine the mechanism by which the glucose is consumed.

The Development of Directional Understanding in Three- to Five-Year-Old Children

Lenae Stansky – CURO Scholar
and Krisztina Varga
Dr. Janet Frick, Department of Psychology, University of Georgia

Endogenous orienting occurs when a meaningful cue, such as an arrow, is used to direct attention toward a peripheral target. Adults and children as young as four years of age respond faster to a target that is cued by a central arrow than to an uncued target. However, the nature of the understanding of the arrow by young children is not well understood. Therefore, the current study explores this issue by setting the perceptual "weight" (which is usually heavier on the side of the arrow head) of the arrow cue against its symbolic meaning (directional indication). In this project, 3- to 5-year-old children were tested using various centrally located arrow cues to test the hypothesis that as development progresses, there is also a progression of understanding of

arrow cues from a perceptual to a symbolic understanding. Children sat in front of a computer monitor and were presented with arrow cues followed by peripheral targets. The time it took them to make an eye movement to the target was measured using frame-by-frame coding. The results showed that 3- to 5-year-olds do not rely entirely on either the perceptual characteristics or on the symbolic nature of an arrow, as no reaction time differences were observed between valid and invalid trials ($p>.05$). Future research is proposed to investigate the understanding that young children have of important directional cues such as arrows.

Using Immunohistochemistry for the Detection of Rabies Antigen in Various Mammalian Species

Lindsay Stein – CURO Scholar
Dr. Corrie Brown, Department of Pathology, University of Georgia

Rabies is a fatal zoonotic viral infection of the central nervous system that can affect all mammalian species, including humans. It is transmitted by the bite of a rabid animal and those infected die of acute progressive encephalitis. The virus tends to localize in specific parts of the brain in various species. Diagnosis of rabies can be problematic and current techniques either have operator safety or test sensitivity problems. The development of immunohistochemistry is a promising tool for safe and accurate detection of rabies infection and has advantages for use in developing countries. In a retrospective study, immunohistochemistry (IHC) was applied to 26 archival cases of rabies using a commercial polyclonal antibody. Eight species were studied including horse, cattle, llama, pig, dog, cat, raccoon and skunk and all cases had been previously diagnosed using histopathology and/or fluorescent antibody testing (FAT). The IHC test successfully highlighted the presence of rabies virus antigen in each species and demonstrated characteristic distributional differences throughout the brain. In carnivores, the hippocampus was the preferred site for rabies antigen, and in horses the spinal cord and medulla oblongata were optimal. For cattle, the preferred site was brainstem followed by cerebellum and for raccoons and skunk, IHC positive staining was widely dispersed. This test should prove useful in enhancing the diagnosis of rabies through informed selection of brain segments for testing. Adoption of IHC for rabies diagnosis in formalin-fixed tissues offers promise for control programs for this serious public health problem.

Power and Influence in Southeast Asia: A Study of the Methods Used by India, China, Japan, and the United States

Giridhar Subramanian – CURO Apprentice, CURO Summer Fellow
Dr. Brock Tessman, Department of International Affairs, University of Georgia

States use either hard or soft power to influence events around them. Hard power relies on military and economic incentives and punishments; soft power uses more abstract aspects of economic dependence or moral authority to reach the desired outcome. This study looks at India, China, Japan, and the United States, known as power countries, and their influence on Southeast Asia. In order to measure hard and soft power's effectiveness, the independent variables are bilateral trade and arms percentage. Bilateral trade measures soft power by looking at what percentage of a Southeast Asian country's GDP comes from bilateral trade with a power country. Arms percentage, which measures hard power, is the percentage of the military expenditure that a state spends on bilateral arms transfers. These variables are then compared with bilateral events data and UN disagreement percentage through a statistical analysis program, STATA. The study seeks to find the relative efficacy of both types of power for a given year. The analysis shows that cooperation is positively correlated with arms percentage and negatively correlated with bilateral trade, which implies that hard power is more effective than soft power over time. It also indicates that both independent variables' significance as factors for increased cooperation rise when they are used together. Therefore, soft power is more effective when it is used with

hard power. These results show that soft power, although important, is not a strong factor in influencing other nations, as select items of literature within the field imply. Hard power is still an important factor in affecting other states' decisions.

Neuropeptide Signaling in *Drosophila*: A Cell-Specific Functional Dissection of the Proprotein Processing Protease *amontillado* (*amon*)

Caroline Sumners
Dr. Michael Bender, Department of Genetics, University of Georgia

Neuropeptide signals are key regulators of cellular growth, development, and physiology in multicellular organisms. Neuropeptides relay signals to cells by binding to membrane-bound receptors initiating intracellular signal transduction networks. Neuropeptides are initially produced as larger inactive precursor molecules that are activated through proteolytic cleavage by proprotein convertases and by other subsequent modification events within the secretory pathway. The *Drosophila amontillado* (*amon*) gene, which is required for normal growth and development, encodes the homolog of the mammalian proprotein convertase 2 (PC2). By investigating the requirements for *amon* function in specific neuronal cell types, we will investigate whether and how neuropeptide processing contributes to the regulation of development and physiology. This thesis specifically considers *amon* function in corazonin-producing neuronal cells. Corazonin is an insect neuropeptide associated with ecdysis, the process of larval molting, and with the regulation of glucose levels. *Amon* mutants show defects in ecdysis and glucose regulation, suggesting that *amon* may act upstream of corazonin. To determine whether *amon* is required in corazonin-producing cells for normal growth and development, we are asking whether reduction of *amon* expression in these cells results in defects in growth, developmental progression, or glucose homeostasis. If loss of corazonin signaling is responsible for defects in *amon* mutants, we predict that reducing *amon* expression should lead to ecdysis defects or hypoglycemia. In a complementary approach, we are investigating whether *amon* is sufficient for rescuing normal growth by restoring *amon* to corazonin-producing cells in an otherwise *amon*-deficient animal.

The Neurotrophic Action of Botulinum Neurotoxin

Joshua Sumislawski – CURO Scholar
Dr. Julie Coffield, Department of Physiology & Pharmacology, University of Georgia

Botulinum neurotoxin, the agent that causes the paralytic disease botulism, is the most poisonous substance known. The ability of botulinum neurotoxin serotype A (BoNT/A) to produce flaccid paralysis makes it both of public-health concern as a biological weapon and of medical interest as a versatile therapeutic agent (BOTOX®). Less appreciated is the frequent observation that poisoned nerve endings respond by initiating and extending neurites. This phenomenon, termed sprouting, has now been proposed as an indication that the binding of BoNT/A to the neuronal membrane activates intracellular signals that are independent of its already well-characterized paralytic action. Supporting this novel idea, recent studies have demonstrated that the ability of the toxin to induce sprouting is concentration-dependent and counteracted by receptor antagonists. This study addressed the hypothesis that BoNT/A promotes neurite outgrowth through a signaling pathway that depends on the second messenger cyclic adenosine monophosphate (cAMP). To test this hypothesis, primary cultures of motor neurons from embryonic mice were exposed to BoNT/A with and without several inhibitors of cAMP-dependent pathways. In the presence of the inhibitors, the ability of the toxin to induce sprouting was eliminated. These results suggest that BoNT/A promotes neurite outgrowth of embryonic motor neurons via cAMP-dependent intracellular signaling. Additional studies are necessary to further our understanding of the neurotrophic action of this potent toxin.

Isolation and Identification of Novel Acidobacteria and Verrucomicrobia from Forest Soil

Shruti Suresh
Dr. William Whitman, Department of Microbiology, University of Georgia

About 5 % of all the prokaryotic cells on Earth are in the soil. These are comprised largely of diverse soil bacteria which play vital roles in the biogeochemical cycles that drive terrestrial ecosystems. However, the metabolic capabilities and ecological functions of many groups of soil bacteria remain unknown due to the lack of cultivation methods to obtain representatives for scientific investigation. The purpose of this study was to isolate and identify novel soil bacteria using new cultivation strategies. Specifically, bacteria belonging to the phyla Acidobacteria and Verrucomicrobia were cultivated after extended incubation in soil chambers. Different microbial media were supplemented with soil extract and inoculated in triplicate with soil suspensions. The plates were incubated for 10 weeks; DNA was extracted and further checked for target organisms by PCR amplification of the16S rRNA gene with phylum specific primers. Individual colonies from replicate plates were transferred to a 96 well block on the same medium. Following growth, these cultures were screened again by the same PCR method. Positive cultures were further purified by subculturing and identified by sequencing of the 16S rRNA genes. Further investigation of these bacteria will help identify their physiological and biotechnological capabilities. These bacteria are predicted to hold great potential in the field of agriculture.

How Parental Gender Beliefs Affect Children's Preference for Gender Stereotyped Toys in Low-Income Families

Leigh Tankersley, Robert J Gentry, and Heather E. Howell
Dr. Tsu-Ming Chiang, Department of Psychology, Georgia College & State University

Parents foster gender socialization by selecting toys, books, and clothes for their children from an early age. Children use these stereotyped gender cues, directed by parents, to guide their understanding of immediate contexts and behaviors. This study examined the influence parental gender attitudes had on the development of children's preference for gender-specific toys from low-income families. Seventy-two children (mean, 41.64 months, 44 boys) were recruited during the last two years from Headstart programs. Parents completed a survey, consisting of parental observations, gender beliefs, and practices regarding purchasing items for their children. Children's toy preference were assessed at school through interviews, toy selection from a given box, and free play with gender-related toys. The toy selection was videotaped and analyzed. The preliminary results showed strong evidence in children's gender stereotyped toy preference. One-way ANOVA revealed significant gender differences in reported favorite toys ($F(1, 17) = 6.766$, $p = .019$) and toys selection from the box ($F(1, 23) = 29.631$, $p = .000$). The top two toys selected by girls were *Polly* (27.5%) and a *Doll* (17.7%), while boys favored *Trucks* (43.5%) and *Fire Fighte*r (22.6%). Parents reported purchasing *truck* ($F(1, 32) = 9.318$, $p = .005$) for boys and *Barbie* ($F(1, 32) = 219.49$. $p = 000$) for girls. Therefore, parental attitude may directly influence children's preference for gender stereotyped toys. Further implications from parental gender socialization will be discussed at the conference.

The Evolution of a Scientific Community Through Social Network Analysis: The Case of Autism

Christine Tarleton – CURO Scholar
Dr. Shane Hamilton, Department of History, University of Georgia

Studies of the social network structures of scientific collaborations can highlight apparent temporal differences within a developing research field. This project will provide a historical analysis for how the autism community has continually evolved as a multi-disciplinary field from 1970 to 2006. Social network visualizations of the autism research community were created using UCINET software, and co-citation analysis provided the

method of linkage. This disciplinary social mapping of autism research during this period indicates that the field has changed dramatically from a weak network with a primarily psychological base in the 1970s to a very robust, interdisciplinary scientific community with a solid genetics core by the late 1990s. A year-by-year analysis of the networks appears to correlate to specific historical events; for example, an increased interest of advocacy groups in autism research post-1996 occurs simultaneously with a more rapid expansion and increased interconnectivity of the autism community. Additionally, the rise and better availability of genetic technology as well as the discovery of a link between Fragile X syndrome and autism occur within a reasonable time frame to suggest that key scientific discoveries affect the makeup and evolution of a scientific community. By thoroughly investigating the history of the autism field and comparing it to a year-by-year analysis of the composition of its scientific community using data previously generated through social network analysis (SNA), this project aims to provide new insight into the historical causes of research field expansion and to determine what types of internal and external causes might shift the disciplinary focus and makeup of a newly emerging research community.

Genetic Duplication and Amplification in the *Acinetobacter baylyi* ADP1 Genome

Jennifer Taylor and Poonam R. Patel
Dr. Ellen Neidle, Department of Microbiology, University of Georgia

Gene amplification is a common process with medical and evolutionary significance. Here, a system for studying gene amplification in the soil bacterium *Acinetobacter baylyi* ADP1 was expanded. Parent strains lacking two transcriptional activators do not grow on benzoate (Ben^-). From these strains, spontaneous Ben^+ mutants arise with multiple copies of a chromosomal region (amplicon) that includes key catabolic genes, thereby increasing gene expression and allowing growth on benzoate. Initially, gene duplication results from recombination between DNA on either side of the amplicon. Homologous recombination then generates additional gene copies that are retained under selection. The characteristic feature of amplification is a junction that identifies the precise position of the initial recombination event. A promoter mutation in the parent strain may have artificially restricted the pool of viable amplification mutants. To remove this bias, we modified protocols by selecting for growth of the original parent strain on an alternative carbon source, anthranilate. In a second approach, a similar parent strain was used that lacked the promoter mutation but retained all other defining characteristics of the original parent strain; mutants were selected for growth on benzoate or anthranilate. Our results indicate that illegitimate recombination was the major type of duplication event underlying amplification. Also, an unusual type of position-specific illegitimate recombination occurred at precise DNA sites in multiple independently-isolated mutants. These conclusions were independent of the presence of the promoter mutation. Overall, the ADP1 system has proven to be viable for efficiently studying gene duplication and may prove useful for elucidating mechanisms.

Human Random Capacities Through Repeated Numeric Sampling

Aileen Thomas – CURO Scholar, CURO Summer Fellow
Dr. Nicole Lazar, Department of Statistics, University of Georgia

Randomness in the macroworld of human actions would contradict the theory of causal determinism, that all events occur as a direct result from antecedent factors, and be a pivotal contribution to philosophical debates on free will. The aim of this research is to understand human capacities and motivations of randomness. Can human beings act truly randomly or are their actions predetermined? Participants completed a short survey and entered 100 "random" digits into a grid. The numeric sequences generated were statistically analyzed through tests described by Donald Knuth in *The Art of Computer Programming, Vol. 2* (1981) to determine their degree of

randomness. These sequences were compared against sequences generated from different methods of randomization consisting of dice rolls, decimal digits of pi, and deterministic formulas used by Texas Instruments programmable calculators and Java, which underwent similar analysis. Hypotheses of uniformity were tested using Chi-Squared analysis in frequency and serial tests. Sequences generated from dice did not adequately pass frequency tests using alpha level 0.05. Alternatively, the nextInt()and nextInt(long n) methods of class Random in Java, randInt(x,y) from Texas Instruments, the decimal digits of pi, and human participants produced sequences that did adequately pass the frequency test. Of these, only human participants failed to pass the more rigorous serial test. Due to the theoretical foundation of the research question, it is impossible to produce concrete conclusions. However, the sequences produced by human participants most closely resembled those produced from deterministic formulas.

Effects of Vertebral Fusion on Lateral Bending Spinal Motion of Women with Adolescent Idiopathic Scoliosis (AIS)

Jennifer Tooher and Jaharris Collier – CURO Apprentice
Dr. Kathy Simpson, Department of Kinesiology, University of Georgia

Spinal fusion is the most accepted procedure currently performed on adolescent idiopathic scoliosis (AIS) patients with scoliotic curvature greater than 40^{o}. The purpose of the overall study is to determine the effects of spinal fusion on range of motion (ROM) during lateral bending tasks. We expect limitations in ROM of lateral bending due to fusion, but there is little understanding of the effects of fusion on vertebral motions or ROM. The pilot test compared the motions of two women with lumbar scoliosis: one with fusion (FUSED) and a control without fusion (NFUSED). VICON® motion-measurement system captured spatial locations of 46 reflective markers on the spine and body during three trials of maximum trunk lateral bending. As hypothesized, FUSED experienced nearly twice the loss of lumbar motion than NFUSED in the lumbar-sacral segments. Both women displayed greater lateral motion of the thoracic compared to the lumbar spine. However, FUSED did not display greater thoracic motion than NFUSED, thereby tentatively disproving that the nonfused spine of AIS individuals will display greater ROM to compensate for the fused section. Future research will potentially confirm these findings and determine spinal ROM and spinal mechanics that AIS individuals use to accomplish functional tasks.

Inhibition of LPA Signaling Pathways by RGS Protein Overexpression in Ovarian Cancer Cells

Kathryn Turner – CURO Scholar, CURO Summer Fellow
Dr. Shelley Hooks, Department of Pharmaceutical & Biomedical Sciences, University of Georgia

Lysophosphatidic acid (LPA) is a signaling molecule that induces survival, metastasis, migration, and growth in ovarian cancer cells by binding to G-protein coupled receptors (GPCRs), which in turn activate G-proteins. Regulator of G-Protein Signaling (RGS) proteins deactivate these G-proteins, and therefore stop the LPA signal. RGS proteins are a likely therapeutic target for the cancer causing activities of LPA because there are multiple forms that bind specifically to different G-proteins, therefore potentially regulating specific signals and outcomes. Previous data suggest that RGS proteins play a role in regulating the LPA signal in ovarian cancer cells. By comparing the effects of LPA in RGS sensitive and insensitive cells, we observed differences in cell growth, cell migration, and the production of the second messengers cyclic adenosine monophosphate (cAMP) and inositol phosphate (IP). My current project focuses on overexpressing specific RGS proteins and determining their effects on LPA stimulated outcomes in SKOV-3 ovarian cancer cells. LPA causes a decrease in the second messenger cAMP, and we have found that overexpression of RGS2 and RGS19 blocks this inhibition, as shown through a cAMP assay. Additionally, LPA causes an increase in cellular

migration, which is also inhibited by RGS2 and RGS19, as shown in a wound induced migration assay. Furthermore, RGS 3 overexpression seems to have no effect on cAMP levels or migration. Future studies include overexpression of other RGS proteins in order to determine their roles, and lowering levels of RGS proteins in ovarian cancer using siRNA.

Antisaccade Performance and Deficit Characteristics in a Normal Population

Manouela Valtcheva – CURO Summer Fellow
Dr. Jennifer McDowell, Department of Psychology, University of Georgia

Patients with the deficit syndrome of schizophrenia suffer from more debilitating and persistent symptoms than nondeficit patients, including severe anhedonia (inability to experience pleasure) in the absence of depression. Previous research suggests a higher degree of cognitive disruption within deficit patients as indicated by poor performance on eye movement paradigms. The antisaccade task requires inhibition of a reflexive glance towards a peripheral stimulus and generation of a glance to an equidistant location in the opposite direction. Normal subjects who score high on clinical scales are often used as a proxy for people at risk for specific mental illnesses. Finding an analog of deficit schizophrenia within a normal participant sample could help in future risk-studies. It was hypothesized that participants displaying a higher number of deficit-like symptoms (high schizotypy (subclinical schizophrenia-like symptoms), high anhedonia, low depression) would have worse antisaccade performance. Normal undergraduates (N=350) completed self-report questionnaires measuring schizotypy, anhedonia, and depression and performed the antisaccade task. Although there were no overall relationships between deficit characteristics and antisaccade performance in the total sample, in the top 25% of the antisaccade distribution, higher schizotypy was associated with worse antisaccade performance. Higher schizotypy ratings were associated with longer antisaccade latencies. Overall, the findings suggest that a group of normal undergraduates, scoring high on self-report clinical scales, have mild disruptions in cognition but are not a good proxy group for the deficit syndrome. Because this may be due to restrictive demographic effects, additional studies with larger, more variable samples would be informative.

Analyzing the Gender Gap in Educational Achievement in Children Ages 5-12

Jessica Van Parys
Dr. David Mustard, Department of Economics, University of Georgia

Several studies investigate differences in early childhood educational achievement by race and ethnicity. Few researchers, however, evaluate the performance gap by gender. This is the first study to use the National Center for Education Statistics (NCES) Early Childhood Longitudinal Study – Kindergarten Cohort 1998-99 (ECLS-K) to analyze the variance in educational achievement by gender in children ages 5-12. The data begin with 12,000 students in kindergarten and provide information on each child's home and school environments at each stage of the evaluation in the kindergarten, first, third, and 5th grades. Using cross-section regression analysis and controlling for socioeconomic status and school characteristics, we find that females score 1/7 of a standard deviation higher than males in standardized reading scores, while males score 1/22-5/22 of a standard deviation higher in standardized math scores. These differences appear in early kindergarten, persist through the 5th grade, and reflect different gaps than classroom grades. Females earn 1/4 of a standard deviation higher reading grades, and there is no statistically significant difference in math grades. The variance in grades does not match the variation in test scores, and indeed, places females ahead of males in this measure of academic achievement. Using a behavioral rating scale as the dependent variable, we find that teachers rate females as more likely to pursue learning activities and display strong interpersonal skills, while males are more likely to externalize problems and exhibit impulsive behavior. These results suggest that more non-cognitive skills at early ages for females may help to explain the

gender gaps in measured educational performance.

Measuring the Orderliness of Thought
Hemali Vin
Dr. Michael Covington, Institute for Artificial Intelligence, University of Georgia

Schizophrenia is a severe brain disorder characterized by disorganized thinking that can significantly interfere with the ability to function normally. Proper treatment is contingent on early detection. The Salient Items Test is a method devised by Dr. Michael Covington to detect each type of disorganized thinking that occurs in schizophrenia. Research shows that when asked to describe a picture, a patient with schizophrenia will often fail to mention all of the prominent objects (salient items) in it, whereas a healthy person will almost always produce a complete list. Dr. Covington is now investigating whether patients with schizophrenia, even when they name all the items, do so in a less orderly fashion than healthy people. My task involves development of a program in the C# programming language to implement a mathematical method for scoring the orderliness of picture descriptions. This program analyzes files of Comma Separated Values (CSV) to create distance matrices of the values. Distance matrices are used to reflect the order of the items in relation to each other. The distance matrices will be compared to a "normal matrix" to determine if there is a difference in scores of the Salient Items Test between healthy controls and of schizophrenia patients. The program is now being tested to assess its usefulness and accuracy. To test the program, artificial data of orderly and disorderly picture descriptions will be constructed and scored. Once perfected, this program could allow for faster and more accurate identification of schizophrenia patients.

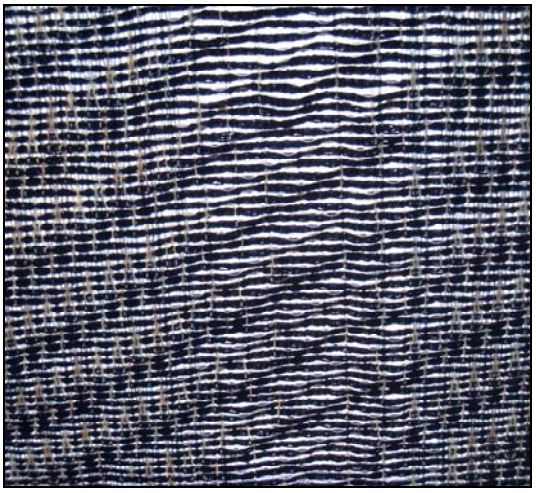
Differential Regulation of Oxidative and Thermal Stress Tolerance upon Changes in Levels of O-GlcNAc Modified Proteins *in vivo*
Wei Wang – CURO Scholar
Dr. Lance Wells, Department of Biochemistry & Molecular Biology, University of Georgia

From *C. elegans* to mice, reduced signaling through the insulin-like pathway extends lifespan. However, reduced signaling, defined as insulin resistance, also precedes and is the hallmark of type II diabetes. Our laboratory has demonstrated previously that elevation in intracellular glycosylation of nuclear and cytosolic proteins via the carbohydrate post-translational modification O-linked beta-N-acetylglucosamine (O-GlcNAc) induces insulin resistance. More recently, the laboratory has demonstrated that the O-GlcNAc cycling enzymes (OGT that adds and OGA that removes the modification) modulate median lifespan in *C. elegans*. Our observations also suggest that O-GlcNAc modification of proteins affects oxidative stress tolerance but not thermal tolerance. We have generated transgenic animals to study how the two processes, oxidative and thermal stress tolerance governed by insulin-like signaling, can be differentially regulated upon changes in the levels of O-GlcNAc modified proteins. Double mutants of oga-1 and ogt-1 with GFP-tagged superoxide dismutase-3 (sod-3) or heat shock proteins (hsp-16) were separately generated and analyzed for differences in activation based on O-GlcNAc modification using the imaging of green florescence protein *in vivo*. Since these two stress response genes are regulated via DAF-16 following its nuclear localization in response to insulin-like signaling, double mutants of daf-16::GFP with oga-1 and ogt-1 were also generated and analyzed for DAF-16 localization and expression. Preliminary data suggest that HSP-16 expression is not affected while SOD-3 is by altering O-GlcNAc levels. Our results suggest that O-GlcNAc is impacting oxidative stress responses in addition to median lifespan in *C. elegans*.

Thermal Adaptation of Soil Microbial Respiration in Laboratory Microcosms
Brian Watts – CURO Apprentice
Dr. Mark Bradford, Odum School of Ecology, University of Georgia

Respiration of heterotrophic microorganisms decomposing soil organic carbon releases carbon dioxide from soils to the atmosphere. In the short-term, soil microbial respiration is strongly dependent on temperature. In the long-term, the response of heterotrophic soil respiration to temperature is uncertain. However, following well-established evolutionary trade-offs that occur during adaptation of respiratory metabolism to the ambient thermal regime, mass specific respiration (R_{mass}) rates of heterotrophic soil microbes should decrease in response to sustained increases in temperature. The principle of evolutionary trade-offs indicates that enzymes kept at a relatively high temperature for a sustained period of time will have lower catalytic rates compared to enzymes kept at relatively low temperatures for a sustained period of time. Using a laboratory microcosm approach, we tested the potential for the R_{mass} of the microbial biomass in six different soils to adapt to three, experimentally-imposed, thermal regimes (constant 10, 20 or 30°C). To determine R_{mass} rates of the heterotrophic soil microbial biomass across the temperature range of the imposed thermal regimes, we assayed soil sub-samples, employing similar approaches to those used in plant, animal, and microbial thermal adaptation studies at days 1, 7, 21, 50, and 77. As would be expected given trade-offs between maximum catalytic rates and the stability of the binding structure of enzymes, significant effects were observed after 77 days of incubation. R_{mass} rates across the range of assay temperatures were greatest for the 10°C experimentally incubated soils and lowest for the 30°C soils, with the 20°C incubated soils intermediate. The time taken for thermal adaptation to manifest (77 days) suggests that it likely resulted from population or species shifts during the experimental incubation. The relative magnitude of the difference in R_{mass} rates between the different incubation temperature treatments was unaffected by assay temperature, suggesting that maximum catalytic rate was the enzyme characteristic involved in thermal adaptation.

Weaving the Fog
Daisy Whelan
Prof. Clay McLaurin, Department of Fabric Design, University of Georgia



Can one determine their own physical position on a day when navigating the clouds becomes the first visual priority? The clouds, manifested as deep fog, provide a blanket of disillusion when positioned so close to the ground. However, the visual distortion that one experiences on a foggy day is based on a structure of perfectly clear water particles. I have interpreted this subject matter through weaving, using some traditional yarns and many alternative materials. Such materials include vinyl-coated yarn, nylon and monofilament mixed with more traditional bamboo, knitted, and cashmere yarns. Weaving lends itself perfectly to interpreting clarity, for the process is a system of design that relies on structure as its livelihood. I have manipulated material and order of pattern, so that my weavings interpret light and movement. Some weavings rely on the density of material to provide disillusion, while others rely on the near invisible nature of the material. Perfect structures form when I allow the setup of the loom to project a perfect pattern. My research tests the viewer's eye. Sometimes lost in the order, the viewer is at other times faced with a complete framework and clarity of order. Positioning is crucial; the weaving will

appear differently depending on the where the viewer stands, just like every position in the fog will take on a different illusion.

Bolivian Wrestlers in Skirts
Abigail Wilson
Dr. Katalin Medvedev, Department of Textiles, Merchandising & Interiors, University of Georgia

Dress serves as a symbolic metaphor of the relationship of the individual to the cultural system and thus is an important means of constructing and articulating gender norms. The analysis of the sartorial practices of indigenous female wrestlers, known as cholitas luchadoras, provides insight into the social/political tension that exists in the contemporary Bolivian society, where domestic and political hostility is rampant. What differentiates the cholitas from (fe)male wrestlers in the Western world is their distinctively feminine and historically grounded dress style. The cholitas consciously choose to wrestle in a lace petticoat, a Spanish-style skirt (also known as a "pollera") and a colorful, fringed shawl because they embrace and choose to highlight their femininity in such a traditionally masculine and often brutal activity. The pollera is the typical dress of native women in Bolivia, thus the cholitas' decision to wear the garment underscores the strength and perseverance of these women in the face of all forms of violence in their lives. Through their impractical use of traditional female dress, they not only contest the misogynist treatment of women but the political and economic disenfranchisement of indigenous people as well. Through their acrobatic acts of wrestling these female wrestlers prove that they can fight without sacrificing their femininity or compromising their ethnic identity. In the process, they are actively reshaping and redefining contemporary gender and political roles in Bolivia. The analysis of the cholitas' practices is informed by Judith Butler's work on the performativity of gender.

Defining and Regaining the Human Identity: Queries of Existence in Frederick Douglass's *Narrative*
Anna Wilson
Dr. Ron Miller, Department of English, University of Georgia

This paper explores the process of dehumanization imposed upon African American slaves within the system of American chattel slavery as it is depicted in *The Narrative of the Life of Frederick Douglass: An American Slave*. What does it mean to be human and, conversely, what does it mean *not* to be human? My research has revealed that Douglass's portrayal is distinguished by animal-related metaphors that the author utilizes to identify the qualities crucial to human identity and thereby the features that are most devastated by the slavery system. This paper also examines Douglass's rebirth into humanity and endeavors to recognize and elucidate the processes by which these vital human traits are re-implemented into the author's life. My paper asserts that this journey can be clearly separated into two major stages: the reacquisition of a personal identity and the acceptance of the right to toil for upward social mobility. Both phases are initiated, fueled, and shaped heavily by Douglass's personal literacy. By clearly differentiating between brute, man, and, perhaps most importantly, the process of transformation from one to the other, Douglass's *Narrative* creates a standard scale that can be utilized to evaluate the process of human progress. My paper reapplies these historically transcending findings in order to examine several notable individuals and events that have taken part and place within the most recent years of the African American timeline.

8-Chloro-7-hydroxyquinoline and Xanthone Acetic Acid Derivatives as Photoremovable-Protecting Groups with Susceptibility to Two-Photon Excitation

Hunter Wilson – CURO Scholar, CURO Summer Fellow
Dr. Timothy Dore, Department of Chemistry, University of Georgia

Photochemistry offers scientists a powerful method of exploring biological processes. Photoremovable protecting groups (PPGs) can quickly release bioactive molecules with a flash of light, activating them and enabling researchers to explore how the timing and location of events triggered by these molecules impact cellular function. In particular, PPGs with sensitivity to a process called two-photon excitation (2PE) enable precise control of the location and timing of release events and often utilize light that is not harmful to biological systems. A firm understanding of how PPG structure impacts 2PE susceptibility is necessary to exploit these powerful compounds to study physiology. The PPG 8-bromo-7-hydroxyquinoline (BHQ) has sensitivity to 2PE sufficient for biological use. The structure of BHQ is based on the compound quinoline. To enhance knowledge of quinoline photochemistry, a similar compound called 8-chloro-7-hydroxyquinoline (CHQ) was synthesized, and its photochemistry studied. The CHQ 2PE cross-section (δ_u), a measure of sensitivity to 2PE, was 0.12 GM at a wavelength of 740 nm. Compared to BHQ, CHQ is less sensitive to 2PE. Two other promising PPGs called 2- and 4-xanthone acetic acid (2-XAA and 4-XAA, respectively) are based on the compound xanthone. The values of δ_u for 2-XAA and 4-XAA were both found to be 2.1 GM at 700 nm. These experiments have established that 2- and 4-XAA have excellent sensitivity to 2PE and might be used to mediate the release of bioactive molecules in biological systems. Our studies are delineating the structural requirements for PPGs to have sensitivity to 2PE.

Preventative Medicine in Water Supplies: A Remodeling of Disaster Relief

Abby Wong – Roosevelt@UGA
Dr. Angela Fertig, Department of Health Policy & Management, University of Georgia

In 2008, the United States Agency for International Development (USAID), a United States federal government organization responsible for non-military foreign aid, responded to over 80 disasters in 63 countries, spending in one fiscal year over $500 million dollars in disaster response. One of the most destructive effects of natural disasters, especially floods and droughts, is the contamination of drinking-water supplies. Communicable diseases such as Typhoid, Cholera, Hepatitis A, and Leptospirosis, as well as intestinal parasites, are easily transmitted through contaminated water, making the accessibility and quality of public water supplies an immediate priority in the aftermath of a disaster. Poor countries bear a disproportionate amount of health risks and lack the necessary economic resources to minimize the impact. Through a systematic review of the current literature, focusing on relevant case studies, interventions, and survey research, this paper provides a comprehensive synthesis of the current research on the humanitarian, political, and economic benefits of effective mitigation action. The findings show that preparatory measures taken by governmental and nongovernmental aid agencies such as USAID would help mitigate outbreaks of water-borne diseases in the aftermath of a natural disaster, when populations are most vulnerable. This research also provides a review of the biological ramifications that water-borne disease outbreaks in developing countries can have on industrialized western societies, like the United States.

A Sense of Self: Questions of Identity in Contemporary Novels by Second-Generation Turkish-German Women Writers

Laura Wynn – CURO Apprentice, CURO Summer Fellow
Dr. Martin Kagel, Department of Germanic & Slavic Languages, University of Georgia

As the largest minority, the Turkish-German population plays an important role in contemporary Germany. Turkish citizens first came to Germany in the wake of a guest worker agreement forged in 1961, which allowed Turkish workers to assist in the rebuilding of Germany during the post-war economic boom. Many guest workers chose to remain in Germany and, over time, the group grew into the largest minority living in the country today. The integration of Turkish guest workers into German society has been difficult and caused much political controversy. Questions about what rights should be afforded these "Fremde," or foreigners and their role in German society as a whole prompted many Turkish-Germans to begin putting their ideas to paper. During the 1970s, literature by Turkish-German authors began to emerge and attract attention and recognition when Emine Sevgi Özdamar won the Ingeborg Bachmann prize in 1991. Since the reunification of Germany in 1989, the publication of literature written by Turkish-German authors has increased significantly, especially as the second generation of Turkish-Germans has come of age. Three novels written by female authors of this second generation of Turkish-Germans depict many of the issues the minority as a whole faces. Alev Tekinay's *Nur der Hauch vom Paradies*, Yade Kara's *Selam Berlin*, and Dilek *Güngör's Das Geheimnis meiner türkischen Grossmutter* also cast light on the specific struggles of Turkish-German women of the second generation. The question of self is the most prominent of the thematic elements in the novels, which can be found in feelings and thoughts the characters express about family, gender, and a missing or incomplete sense of belonging in what remains a foreign country. My analysis of the novels against the historical background of both the individual authors and the Turkish-German minority as a whole traces the conflicts and discusses the answers the authors attempt to provide.

Simplification of Eligibility Requirements for PeachCare for Kids: Increasing Health Insurance Coverage for Georgia's Children

Tracy Yang – Roosevelt@UGA
Dr. Phaedra Corso, Department of Health Policy and Management, University of Georgia

PeachCare for Kids (PCK), part of the State Children's Health Insurance Program (SCHIP), provides low-cost health coverage for children residing in Georgia. PCK is administered by the Georgia Department of Community Health (DCH). In 2007, the DCH increased documentation requirements regarding proof of income, citizenship, and identity. These measures were not instituted in response to abuses of the program by ineligible individuals according to DCH officials. State and national legislation, academic literature, information from the DCH, and other sources were analyzed to research enrollment patterns of eligible but uninsured children across the U.S. after the implementation of increased documentation requirements to determine SCHIP eligibility. Various nationwide studies have found that increasing required documentation for enrollment in SCHIP has mostly resulted in coverage gaps and denials for eligible children. Analysis of these studies suggests that administrative hurdles regarding eligibility for PCK will result in decreased coverage of eligible children in Georgia, increased administrative costs, and decreased health outcomes for children overall. The reinstatement of simplified verification methods could help maintain and improve child health in Georgia. It is more cost-effective to insure children and provide them with preventive care than to treat later health problems through uncompensated care, especially in light of the recent SCHIP bill signed by President Obama providing potential funding. The basic goal of PCK is to provide health insurance for low-income children in order to improve health outcomes. Increasing enrollment of uninsured children already eligible for PCK will help Georgia reach this goal.

Kennedy, Carter, and Obama: The Role of Faith in Three Democratic Presidential Campaigns

Emily Yeager
Dr. D. Jason Berggren, Department of Political Science, University of Georgia

The constitutional separation of church and state does not preclude the separation of religion and politics; in fact, religion plays a fundamental role in both the Democratic and Republican parties. Popular thought tends to describe the Republican Party as the party of religious voters and religious candidates, but such a description disregards the role and reality of religious faith in the Democratic Party. In this paper, I evaluate public statements from three modern Democratic presidential nominees: John Kennedy, Jimmy Carter, and Barack Obama. There emerge not only faith narratives, discussion of faith's influence on policy, and religious rhetoric, but multiple interpretations of each. I will demonstrate that faith can shape a Democratic campaign in diverse, significant, and unexpected ways.

Expansion and Improvement of the Solar Cooker Project to Reduce Gender Based Violence

Yasmin Yonis – Roosevelt@UGA
Dr. Njeri Marekia-Cleaveland, Carl Vinson Institute of Government, University of Georgia

United Nations High Commissioner for Refugees (UNHCR) introduced the Solar Cooker Project, a program where solar cookers are distributed to refugee women for their cooking needs in select African refugee camps in 2005. Deforestation has increased the distance traveled by female refugees to gather firewood for their basic needs, significantly increasing their vulnerability to gender based violence (GBV), including rape, beatings, and murder. The use of solar energy for cooking has dramatically decreased the amount of firewood needed, minimizing the number of trips outside the safety of the refugee camp. This policy paper encourages the expansion of the Solar Cooker Project to other refugee camps with GBV associated with a need for an alternative cooking energy. The various issues associated with GBV in refugee camps—deforestation, local community tensions over resources, lack of clean water, gender roles, and economic disparity—are explored. Through the analysis of the wide array of factors contributing to GBV rates against female refugees, case studies of the Solar Cooker Project, and interviews with the agencies associated with the creation of the Solar Cooker Project, recommendations are provided to improve upon specific components of the project. New initiatives are also suggested to better financial support, environmental issues, and socioeconomic problems associated with the issue. This research is necessary in order to increase the level of success in helping to eliminate GBV in affected areas and allow for efficient expansion of the project to other UNHCR refugee camps in Africa.

Effect of Microbead Substrates on the Morphology of H945RB.3 Human Neural Progenitor Cells

Angela Zachman
Dr. William Kisaalita, Department of Biological & Agricultural Engineering, University of Georgia

Cells grown *in vitro* are known to have morphological differences from *in vivo* cells, in part due to the flat surface of a petri dish on which they are typically grown. These morphological differences can cause problems in using *in vitro* testing to predict *in vivo* behavior. Growing cells on microbead arrays could allow cultured cells to more closely resemble cells in the body. Previous research has shown that H945RB.3 human neural progenitor cells grown on 2µm diameter bead arrays have a larger area and perimeter than cells grown on a flat surface. In this experiment, we tested the morphological differences of cells grown on smaller 0.5µm diameter beads. Polystyrene beads in solution were spread over a portion of polystyrene coverslips, creating some areas of flat substrates and some areas of microbead substrates. Neural progenitor cells were then cultured on the coverslips and allowed to differentiate for fourteen days. The cells were then fixed on the substrates, dehydrated, and sputter-coated with

gold in preparation for scanning electron microscopy (SEM). Images were taken of cells on both the flat and microbead substrates using SEM, and the area, perimeter, and roundness (defined as $4*\pi*(\text{area})/(\text{perimeter})^2$) of each cell was calculated using computer imaging software. Contrary to our expectations, we found that cells grown on 0.5µm bead arrays had a larger area and perimeter than those of cells grown on either a flat surface or 2µm bead arrays. This indicated that 0.5µm bead arrays are an ideal substrate for cell growth.

Jewelry in the Age of Postmodernism

Marilyn Zapf
Prof. Mary Pearse, Department of Jewelry & Metalwork, University of Georgia

My current work investigates the role of jewelry in society through postmodern methods of critique. I use imitation to point to mass-produced and mass-consumed jewelry, while subtle changes create a distance between the symbol (jewelry) and the signified (status, wealth, and self-image creation). The necklaces reference nameplate necklaces, a trend in the 1980s that re-emerged in 21st century when Sarah Jessica Parker wore one on the HBO series *Sex and the City* and again (in an exaggerated form) in hip hop culture. Additionally, the necklaces are documented in the same context one would expect to find commercial jewelry: paparazzi-like photographs and snapshots found in popular style magazines. However, traditional materials such as gold and silver are not used but mimicked through the use of enamel or a colored glass surface applied to the base metal copper. In addition, the words spell out the role jewelry plays in society, such as a "signifier" of wealth and a creator of someone's self-image. My necklaces literalize the function of jewelry in order to simultaneously reveal and subvert the task of ornamentation in popular culture. My work suggests what is really being bought and sold when people buy jewelry through the reference to, but deviation from, popularly recognized materials, forms, and documentation of jewelry.

Genetic Effects of Radiation Exposure on *Rana terrestris* Populations from the Chernobyl Exclusion Zone

Sheena Zhang
Dr. Travis Glenn, Department of Environmental Health Science, University of Georgia

Chernobyl, the largest nuclear disaster in history, resulted in the mass exposure of humans and other species to radiation, which is known from other studies to increase mutation frequencies in DNA. The Chernobyl Exclusion Zone is abundant with amphibians, which are extremely sensitive to contaminants. To determine the effect of radiological exposure on mutation rates, *Rana terrestris* were collected from the Chernobyl Exclusion Zone, as well as nearby non-exposed control sites, and subsequently bred. DNA was extracted from 48 offspring from each of four families (2 contaminated, 2 control). Twelve microsatellite loci (i.e., repetitive regions of DNA that are codominantly inherited) were identified in the *Rana* genome and amplified using Polymerase Chain Reaction (PCR). The PCR products were run on an ABI 3730xl sequencer and analyzed using Genemapper 3.7 software. By comparing the lengths of the microsatellite DNA fragments between parents and offspring, it can be determined if any mutations have occurred. As the average mutation rate for most microsatellites is around $10E^{-3}$ (e.g., one in a thousand), we expect to identify as many as 1-10 baseline mutations within each of the four families. Analysis of Variance (ANOVA) will then be used to compare the number of mutations between control and contaminated sites to determine if radiation from nuclear

fallout has caused an increased mutation rate. The results from this study will help to quantify the impact and genetic risks associated with the Chernobyl disaster, while providing the experimental design to assess potential negative effects from other radiological exposure.

The Center for Undergraduate Research Opportunities is grateful to the following sponsors for underwriting the 2009 Symposium.

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The Honors Program's
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2010 Symposium Program and Abstracts

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Table of Contents

CURO
Center for Undergraduate Research Opportunities

Symposium 2011

Classic Center
Athens, Georgia
Monday, April 4, 2011

CALL FOR ABSTRACTS

The Center for Undergraduate Research Opportunities at the University of Georgia provides a forum for undergraduates with a 3.4 GPA or who participate in a university-wide research program to present original research and creative works sponsored by faculty members. Undergraduate students from all disciplines are encouraged to participate. Representatives of public and private higher education institutions in Georgia are encouraged to apply.

Scholarly presentations may be in the form of an oral presentation, poster session, exhibition, performance, or work of art. Students can also present a tutorial about a research methodology or new technology. Undergraduate researchers who are at various stages of the research process are encouraged to submit abstracts describing where they are in the research process and the issues they face. Honors thesis students can also present in a Roundtable Forum. The Roundtables offer undergraduates pursuing an Honors thesis the opportunity to present their research to other thesis students working in the same discipline. Those who wish to present their work should submit an application and an abstract of a maximum of 250 words no later than **January 21, 2011** and a brief supporting letter from the sponsoring faculty member no later than **January 30, 2011** via the CURO web site. Group research projects should be submitted with one application and one letter of faculty support. All abstracts will receive graduate student peer review and feedback. All participants accepted into the Symposium will be notified by February 12, 2011, and their abstracts will be published in a book of abstracts. Sponsoring faculty are invited to preside at their students' sessions.

Best Paper Awards
Papers on work being presented at the CURO Symposium submitted by February 26, 2011 will be considered for Best Paper awards in the categories of humanities, social sciences, civic responsibility focus, international focus, and sciences. Papers must be submitted electronically to curo@uga.edu. Maximum length is 12 pages, double spaced, excluding references and appendices.

Purposes of the Symposium:
- To highlight excellence in research by undergraduate students
- To enrich the undergraduate experience by promoting communication and cooperation between faculty and students
- To provide a forum for undergraduates to communicate and disseminate their research findings and creative works
- To provide an opportunity for undergraduate researchers in the state of Georgia to engage with their peer researchers

Criteria for Selection:
- Originality and quality of research
- Quality of written abstract
- Ethical and responsible research
- Extent of the undergraduate student's involvement in development of the research design and execution of the project. Research presented at the Symposium should go beyond work completed for a class paper or project.
- Letter of support from supervising faculty

This event will be free and open to the public. All interested faculty and students are encouraged to attend the CURO 2011 Symposium. Free parking will be available at the Classic Center. Free UGA bus transportation will be available from specified locations. For more information, contact curo@uga.edu, (706) 542-5871.

JURO@GA The University of Georgia's Journal for Undergraduate Research Opportunities

CALL FOR SUBMISSIONS

The Journal for Undergraduate Research Opportunities publishes original research papers in the areas of humanities, social sciences, and policy as well as art-related content. You **must present your work at the annual CURO Symposium to be eligible for publication**. Submissions are accepted throughout spring semester at http://www.uga.edu/juro/.

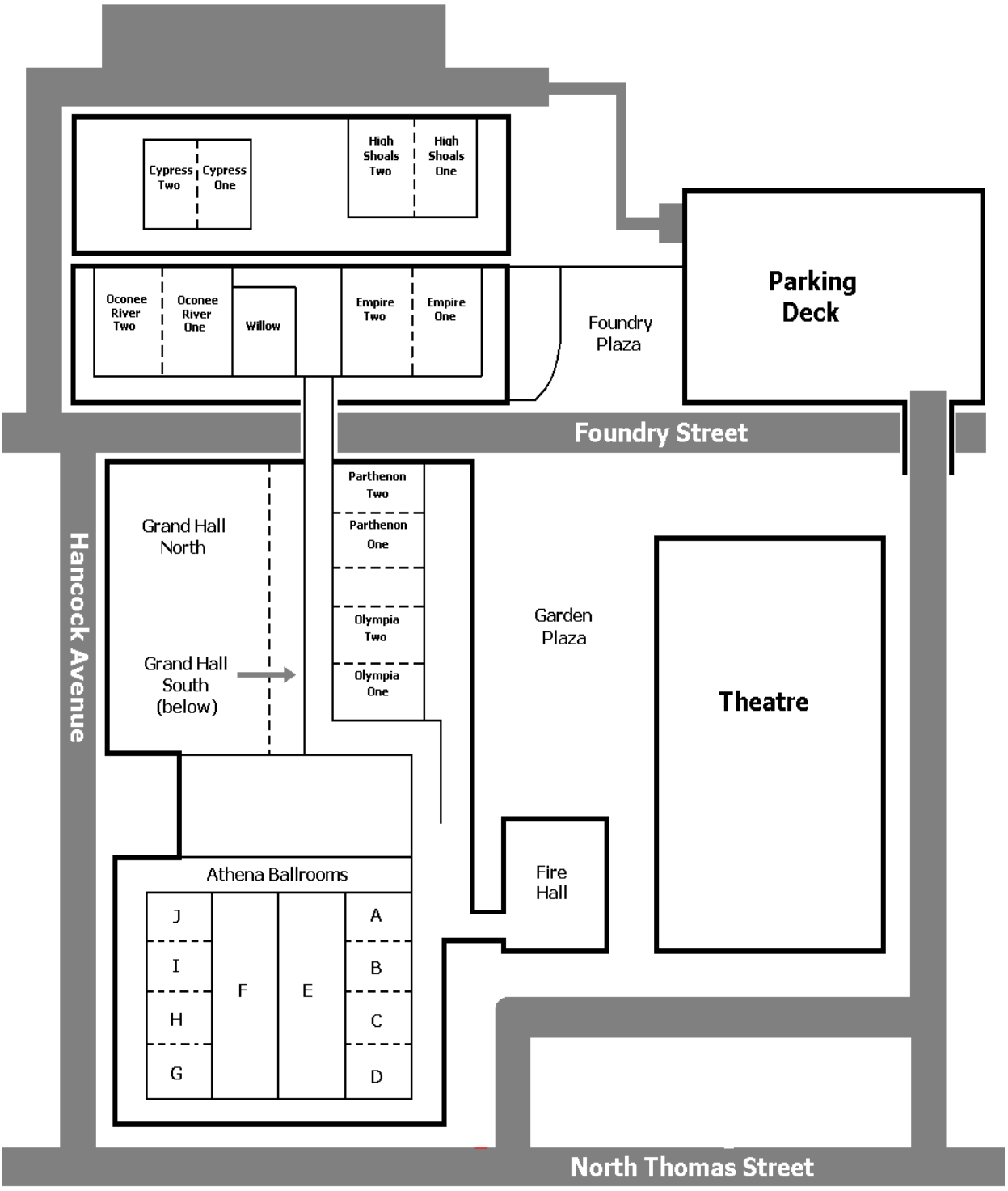
The following general format should be adhered to as closely as possible. The cover page should include the student researcher's name, major, year of anticipated graduation, faculty advisor's name, and institution attended. This information should be followed immediately by the abstract. The research article itself may be organized into the following sections: introduction, methods, findings, conclusion, and references.

Additionally, work submitted to JURO@GA must adhere to the following guidelines:

1. Maximum length is 30 pages, double-spaced. Theses can be shortened to comprise the central idea of the research in order to be eligible for publication in the journal.
2. All submissions are submitted in English unless other arrangements are made.
3. All work must be submitted with an abstract no longer than 250 words. The abstract should provide a background sufficient to establish a context for understanding the research, summarize the research article itself, and highlight the major results.
4. References should be organized according to the standard format for the individual discipline the research topic falls under, e.g. Modern Language Association, Council of Biology Editors, American Psychological Association, or Chicago style format.
5. Work must be fully represented in digital form (preferably a Microsoft Word document for papers) and emailed to juro@uga.edu.
6. All submissions must be accompanied by a completed Submission and Faculty Advisor Approval Form found on the website at http://www.uga.edu/juro/.

Submissions will be evaluated according to criteria established by the editorial staff of the journal. Incoming research will be reviewed first by JURO@GA's content editors and other staff members. Prospective publications are subject to the approval of the journal's Editor-in-Chief. Upon completion of the review, the author may expect to receive either a notification of acceptance, acceptance with revisions, or a rejection of submission. Any questions about the submission process or the journal itself should be directed to juro@uga.edu. JURO@GA wishes you the best of luck with your CURO Symposium presentation and looks forward to reviewing the finished product of your hard work.

Contact JURO at JURO@uga.edu or visit our website at http://www.uga.edu/juro/


Cypress Two
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High Shoals Two
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Oconee River Two
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Empire Two
Empire One
Foundry Plaza
Parking Deck
Foundry Street
Hancock Avenue
Grand Hall North
Grand Hall South (below)
Parthenon Two
Parthenon One
Olympia Two
Olympia One
Garden Plaza
Theatre
Athena Ballrooms
J
I
H
G
F
E
A
B
C
D
Fire Hall
North Thomas Street

Monday, March 29, 2010

Begin registration of oral and poster presenters; students hang up posters — **8:30 a.m.**
Classic Center, Lobby

Concurrent Oral Sessions — **10:10 a.m.**
Classic Center, Athena Breakout Rooms A, B, C, D, G, H, J

Thesis Roundtable Session — **10:10 a.m.**
Classic Center, Parthenon Room

Concurrent Oral Sessions — **11:15 a.m.**
Classic Center, Athena Breakout Rooms A, B, C, D, G, H, J

Thesis Roundtable Session — **11:15 a.m.**
Classic Center, Parthenon Room

Concurrent Oral Sessions — **12:20 p.m.**
Classic Center, Athena Breakout Rooms A, B, I

Concurrent Oral Sessions — **1:25 p.m.**
Classic Center, Athena Breakout Rooms A, C, D, I, J

Concurrent Oral Sessions — **2:30 p.m.**
Classic Center, Athena Breakout Rooms A, B, C, D, G, H, J

Welcome and Opening Session — **4:00 p.m.**
Classic Center, Athena Ballroom E
Dr. David S. Williams
Director, Honors Program
Professor Jere W. Morehead
Senior Vice President for Academic Affairs and Provost

Recognition of CURO Promising Scholars
Dr. Pamela B. Kleiber
Associate Director, Honors Program

Introduction of Keynote Speaker
Matthew Sellers
Managing Editor, JURO
2009 CURO Summer Research Fellow
English and Chemistry, 2012

Keynote Address: ***Conservation and the Global Search for Sustainability***
Dr. Peter Brosius
Professor, Department of Anthropology
Director, Center for Integrative Conservation Research

Announcement of Excellence in Undergraduate Research Mentoring Award
Dr. David C. Lee
Vice President for Research

Poster Session, Science as Art & Visual Art Exhibit **5:00 p.m.**
Classic Center, Grand Hall South (downstairs)

CURO Apprentice & Promising Scholars' Dinner **6:15 p.m.**
Classic Center, Olympia Room

Announcement of CURO Summer Research Fellows, CURO Scholars, UGA Libraries Undergraduate Research Awards, and Best Paper Awards **6:15 p.m.**
Classic Center, Parthenon Room

Dr. Pamela B. Kleiber
Associate Director, Honors Program
Ms. Caroline Barratt
Director, Miller Learning Center Library Commons
Ms. Deborah Dietzler
Executive Director, UGA Alumni Association

Monday, March 29, 2010

Concurrent Oral Sessions

Classic Center, Athena Breakout Rooms A, B, C, D, G, H, J

10:10 – 11:00 a.m. First Concurrent Session

Room A	**Matt Sellers**	The Significance of Spiritual Experience in Robert Penn Warren's Poetry
	Faculty Mentor	Dr. Hugh Ruppersburg, Department of English
	Alexander Brown	On a Generalization of the Frobenious Problem
	Faculty Mentor	Dr. Dino Lorenzini, Department of Mathematics
	Dillon Horne	A Study of Predictive Modes of Thought with a Focus on Religion, Astrology, and Probability Theory
	Faculty Mentor	Dr. Thomas Cerbu, Department of Comparative Literature
Room B	**Michael Slade**	Dialectic in Late Plato
	Faculty Mentor	Dr. Frank Harrison, Department of Philosophy
	Sarah Quinn	Imagination and Institution: The Effects of Surrealism and Catholicism on the Work of Oscar Dominguez
	Faculty Mentor	Dr. Janice Simon, Department of Art History
	Jared La Croix	The Old Made New: The Life and Work of Art Rosenbaum
	Faculty Mentor	Dr. Robert Pratt, Department of History
Room C	**Sara Day**	Digital Proliferation: Discerning New Literary Genres Spawned by Digital Technology
	Faculty Mentor	Dr. Elizabeth Davis, Department of English
	Richard McKelvey	The Skeleton Keyhole
	Faculty Mentor	Prof. Andrew Zawacki, Department of English
	Daniel Cellucci	Remote Sensing as a Generative Tool in the Creation of Fine Art
	Faculty Mentor	Prof. R. G. Brown, Department of Sculpture, Studio Foundations
Room D	**Lucas Puente**	Castro as a Capitalist: The Role of Foreign Investment in Cuba
	Faculty Mentor	Dr. Maurits van der Veen, Department of International Affairs
	Archil Japaridze	Abandon Hope All Ye Who Enter: The Solution to the Cartel Crisis in Mexico
	Faculty Mentor	Dr. Sergio Quesada, Department of Latin American and Caribbean Studies
	John Seewoester	Second Chances: Establishing an Administrative Expungement Procedure
	Faculty Mentor	Dr. Ed Risler, School of Social Work

Room G	**Ilana McQuinn**	Repression, Literature, and the Growth and Metamorphosis of Czech National Identity in the 20th Century
	Faculty Mentor	Dr. John Morrow, Department of History
	David Malison	Separate but not Equal: An Analysis of Segregation and Inequality in Georgia Public Schools
	Faculty Mentor	Dr. David Mustard, Department of Economics
	JoyEllen Freeman	Patriotism and Protest in Georgia's Civil Rights Movement: The 1971 Columbus Policemen's Strike
	Faculty Mentor	Dr. Barbara McCaskill, Department of English
Room H	**Jessica Alcorn**	Television News Coverage of the 2010 Tea Party: A Niche for Everyone?
	Faculty Mentor	Dr. Audrey Haynes, Department of Political Science
	Katherine Cherry	The Reinstatement of the USIA: Combating the Threat of Anti-Americanism in the Post 9/11 World
	Faculty Mentor	Dr. Howard Wiarda, Department of International Affairs
	Bridget Mailley	Answering the Call for Equity, Relevance, and Inclusion: Rethinking the Role of the Disciplinary Alternative Education in the Savannah-Chatham County Public School System
	Faculty Mentor	Dr. Amy Ross, Department of Geography
Room J	**Rebecca Kopp**	Effects of Social Institutions on Adolescent Alcohol Use
	Faculty Mentor	Dr. Thomas McNulty, Department of Sociology
	Michael Thomas	Breaking the Rules: A Qualitative Study of Academic Dishonesty at the University of Georgia
	Faculty Mentor	Dr. Mark Cooney, Department of Sociology
	Mallory Roman	The Importance of Peer Approval in the Sartorial Purchasing Patterns of University of Georgia Students
	Faculty Mentor	Dr. Katalin Medvedev, Department of Textiles, Merchandising & Interiors

10:10 – 11:00 a.m. First Thesis Roundtable Session

Classic Center, Parthenon Room

Table 1	**Caroline Colden**	The Temporal Distribution of the Vesticular Stomatitis Virus in Experimentally Infected Cattle: An Immunohistochemical Study
	Faculty Mentor	Dr. Corrie Brown, Department of Pathology
	Natasha Lee	Complementation of Chromosomal Deletions in Mycobacteria
	Faculty Mentor	Dr. Russ Karls, Department of Infectious Diseases

	Jonathon Nolen	Examination of Resuscitation-Promoting Factors in Potential Fish Pathogens in *Mycobacterium shottsii* and *M. pseudoshottsii*
	Faculty Mentor	Dr. Russ Karls, Department of Infectious Diseases
	Margaret McDougal	PAX6 Mutation Screen
	Faculty Mentor	Dr. James Lauderdale, Department of Cellular Biology
Table 2	**Marcus Hines**	Analyzing the Function of O-GlcNAc in the *Drosophila* Nervous System
	Faculty Mentor	Dr. Michael Tiemeyer, Department of Biochemistry & Molecular Biology
	Susan Klodnicki	Pediatric Seizures in Larval Zebrafish
	Faculty Mentor	Dr. James Lauderdale, Department of Cellular Biology
	Lindel Krige	Coagulation Factors Involved in the Pathology of Placental Malaria
	Faculty Mentors	Dr. Julie Moore, Department of Infectious Diseases
Table 3	**Sook Kyung Yoon**	The Effect of Online Communication and Social Support on Positive Emotion and Health Outcomes in Individuals Treated with Ileoanal Reservoir Surgery
	Faculty Mentor	Dr. Kimberly Clay, School of Social Work
	Rebecca Feistritzer	The Effects of Stress-Induced Analgesia and Peripherally-Administered Cannabinoid Receptor Antagonists on Formalin-Induced Pain Behavior
	Faculty Mentor	Dr. Andrea Hohmann, Department of Psychology
	Manouela Valtcheva	Brain Activity Analysis of Good and Poor Performers During Inhibitory Eye Movements
	Faculty Mentor	Dr. Jennifer McDowell, Department of Psychology
Table 4	**Ellyn Echols**	Inclusionary Zoning: Promoting Affordable Housing in the Southeastern United States
	Faculty Mentor	Dr. Andrew Carswell, Department of Housing & Consumer Economics
	Kathryn McCabe	Increasing Personal Finance Education in Athens-Clarke County High Schools
	Faculty Mentor	Dr. Michael Rupured, Department of Housing & Consumer Economics
	Carolyn Crist	Teaching Journalists to Cover Poverty: The Where, Why, and How
	Faculty Mentor	Prof. John Greenman, Department of Journalism

11:15 – 12:05 p.m. Second Concurrent Session

Classic Center, Athena Breakout Rooms A, B, C, D, G, H, J

Room A	**Matthew Sellers**	Here and Queer: Creating Equal Protection for LGBTQ Students in Georgia Public High Schools
	Faculty Mentor	Dr. Robert Hill, Department of Lifelong Education, Administration & Policy
	Katie Deray	Karma in America: The Rebirth of the Male Adolescent Indian into the American Hip-Hop Subculture
	Faculty Mentor	Dr. Katalin Medvedev, Department of Textiles, Merchandising, & Interiors
	Trenton Mize, Tré Myers	Racial and Skin Tone Differences in Facial Thermography and Self-Reported Emotion in Response to Visual Stimuli
	Faculty Mentor	Dr. Dawn Robinson, Department of Sociology
Room B	**Jenny Brickman**	Not So Pretty: The Need for Cosmetics Regulation Reform
	Faculty Mentor	Dr. Jeffrey Fisher, Department of Environmental Health Sciences
	Christine Akoh	Effect of Cation Chelators on Biofilm Formation in a Prolific Versus Non Prolific Biofilm Forming Strain of *Listeria monocytogenes*
	Faculty Mentor	Dr. Joseph Frank, Department of Food Science & Technology
	Chris Harding	Conjugal Transfer of Virulence in the Opportunistic Intracellular Actinomycete *Rhodococcus equi*
	Faculty Mentor	Dr. Mary Hondalus, Department of Infectious Diseases
Room C	**Kema Hodge**	Trends in Reporting Sustainability Actions
	Faculty Mentor	Dr. Richard Watson, Department of Management Information Systems
	Juliet Allan	Designing an Efficient and Effective Cap-and-Trade System
	Faculty Mentor	Dr. Jeff Mullen, Department of Agricultural & Applied Economics
	Emily Pierce	The Genetic Alteration of Soybean to Promote the Production of Astaxanthin
	Faculty Mentor	Dr. Wayne Parrott, Department of Crop & Soil Sciences
Room D	**Paul Moon**	The Local Weather: The Effects of Construal Level and Weather Self-Control
	Faculty Mentors	Dr. Michelle vanDellen, Department of Psychology

	Andrea Borders, Blair Morton, Erin Gilstrap, Lauren Heard	The Impact of Single-Parents and Their Disciplinary Strategies on Childhood Aggression
	Faculty Mentor	Dr. Tsu-Ming Chiang, Department of Psychology, Georgia College & State University
	Amanda McKenley	Children's Attachment Security and Mothers' Separation Anxiety
	Faculty Mentor	Dr. Hui-Chin Hsu, Department of Child & Family Development
Room G	**Bryn Murphy**	Keeping PACE: Clean Energy Financing for Athens-Clarke County
	Faculty Mentor	Dr. Andrew Carswell, Department of Housing & Consumer Economics
	Christy Boudreau	Feeding the Energy Supply: The Market for Biodiesel in Costa Rica
	Faculty Mentor	Dr. Rebecca Moore, Warnell School of Forestry & Natural Resources
	Saptarsi Mukhopadhyay	Energy Efficiency Funding in Athens-Clarke County
	Faculty Mentor	Dr. Tyra Byers, Odum School of Ecology
Room H	**Connor McCarthy, Robert Thrasher**	The Effect of Political and Economic Shifts on Private Charitable Giving
	Faculty Mentor	Dr. David Mustard, Department of Economics
	Stephen Earnest	The Medical Malpractice Crisis: A Proposed Radical Solution
	Faculty Mentor	Prof. Thomas Eaton, School of Law
	Ryan Prior	Humanities in Medicine
	Faculty Mentor	Dr. Katarzyana Jerzak, Department of Comparative Literature
Room J	**Harrison Grace**	Exploring the Mechanisms of Neuron Specific Glycosylation in Embryonic *Drosophila melanogaster*
	Faculty Mentor	Dr. Michael Tiemeyer, Department of Biochemistry & Molecular Biology
	Rebecca Feistritzer	The Effects of Stress-Induced Analgesia and Peripherally-Administered Cannabinoid Receptor Antagonists on Formalin-Induced Pain Behavior
	Faculty Mentor	Dr. Andrea Hohmann, Department of Psychology
	Margaret McDougal	PAX6 Mutation Screen
	Faculty Mentor	Dr. James Lauderdale, Department of Cellular Biology

11:15 – 12:05 p.m. Second Thesis Roundtable Session

Classic Center, Parthenon Room

Table 1	**Amar Mirza**	A Tail's Tale: ErbB Structure, Evolution, and Function
	Faculty Mentor	Dr. Natarajan Kannan, Department of Biochemistry & Molecular Biology
	Shannon Cummins	Diminution of Concentrative Nucleoside Transporter 1 (CNT1) Activity in Human Ovarian Cancer Cells: Subtype-Dependent Gemcitabine Response to Exogenously Expressed hCNT1
	Faculty Mentor	Dr. Rajgopal Govindarajan, Department of Pharmaceutical & Biomedical Sciences
	Yu Taniguchi	DNA Methylation Related to Cancer
	Faculty Mentor	Dr. Shaying Zhao, Department of Biochemistry & Molecular Biology
Table 2	**Joe Reynolds**	Spiritual Life: Self-Transformation in the Ancient and Modern World
	Faculty Mentor	Dr. Frank Harrison, Department of Philosophy
	Josephine Kwon	Public Views of Biculturalism
	Faculty Mentor	Dr. Victoria Plaut, Department of Psychology
	Mary Boyce Hicks	Gov. James McDowell and the Virginia Slavery Debate of 1831-1832
	Faculty Mentor	Dr. John Inscoe, Department of History
	Laura McDonald	A New Definition of Treason: The 1794 Treason Trials
	Faculty Mentor	Dr. Kirk Willis, Department of History
Table 3	**Rebecca Faulkner**	The Perfect Man: Reconstructing the Self Through the Prose and Poetry of Muhammad Iqbal
	Faculty Mentor	Dr. Max Reinhart, Department of Germanic & Slavic Languages
	Richard McKelvey	The Skeleton Keyhole
	Faculty Mentor	Prof. Andrew Zawacki, Department of English
	Michael Slade	Dialectic in Late Plato
	Faculty Mentor	Dr. Frank Harrison, Department of Philosophy
	Ilana McQuinn	Repression, Literature, and the Growth and Metamorphosis of Czech National Identity in the 20th Century
	Faculty Mentor	Dr. John Morrow, Department of History
Table 4	**David Malison**	Separate but not Equal: An Analysis of Segregation and Inequality in Georgia Public Schools
	Faculty Mentor	Dr. David Mustard, Department of Economics

	Jeremy Akin	Demystifying the Conflict Culture: Understanding the Effects of Zero Tolerance on Students in a Georgia Disciplinary Alternative Education Program
	Faculty Mentor	Dr. Larry Nackerud, School of Social Work
	Rebecca Kopp	Effects of Social Institutions on Adolescent Alcohol Use
	Faculty Mentor	Dr. Thomas McNulty, Department of Sociology
	Emily Baggett	Familial Predictors of Young Adult Romantic Relationship Functioning: A Closer Look at Boundary Dissolution
	Faculty Mentor	Dr. Anne Shaffer, Department of Psychology
Table 5	**Sharon McCoy**	The Success of Recent U.S. Foreign Policy in Latin America
	Faculty Mentor	Dr. Loch Johnson, Department of International Affairs
	Ashley Doliber	Somalia: Recommendations for Conflict Resolution Where Failure is the Norm
	Faculty Mentor	Dr. Jaroslav Tir, Department of International Affairs

12:20 – 1:10 p.m. Third Concurrent Session

Classic Center, Athena Breakout Rooms A, B, I

Room A	**Charles Ginn**	Charting the Legacy of Southern Womanhood in Southern Gothic Fiction
	Faculty Mentor	Dr. Hugh Ruppersburg, Department of English
	Caylee Bale	I Do, but I Don't: The Politics of Dress in Gay and Lesbian Commitment Ceremonies in the United States
	Faculty Mentor	Dr. Katalin Medvedev, Department of Department of Textiles, Merchandising & Interiors
	Matthew Glass	Deterministic Assumptions of Positive Freedom
	Faculty Mentor	Dr. Daniel Kapust, Department of Political Science
Room B	**Patrick Smith**	The Long Road to Zero: U.S. Declaratory Policy and Nonproliferation
	Faculty Mentor	Dr. Dmitriy Nikonov, Center for International Trade & Security
	Joe Reynolds	Spiritual Life: Self-Transformation in the Ancient and Modern World
	Faculty Mentors	Dr. Frank Harrison, Department of Philosophy
	Tony Pelli	Reining in the Drone Wars: Creating Criteria for the C.I.A. Drone Program in Pakistan
	Faculty Mentor	Dr. Fred Manget, Department of International Affairs
Room I	**Corbin Busby**	The Abandonment of Truth: Imaging Brad Pitt as a Celebrity Hero
	Faculty Mentor	Prof. Isabelle Wallace, Department of Art History

	Joshua Dunn	The Youth of Roswell Voices
	Faculty Mentor	Dr. William Kretzschmar, Department of Linguistics
	Jane Rowden	Writing in Conversation with the Traditional Narratives of Journey
	Faculty Mentor	Prof. Reginald McKnight, Department of English

1:25 – 2:15 p.m. Fourth Concurrent Session

Classic Center, Athena Breakout Rooms A, C, D, G, H, I, J

Room A	**Charles Blackburn**	Femininity, Freakishness, and Despair in the Novels of Harry Crews
	Faculty Mentor	Dr. Hugh Ruppersburg, Department of English
	Jill Moore	Queens of Scream: The Making of Horror Film Heroines
	Faculty Mentor	Dr. Katalin Medvedev, Institute for Women's Studies
	Julia Carpenter	One Heart Flaming More than All the Rest: Considering Biography When Reading the Poetry of Lady Mary Wroth
	Faculty Mentor	Dr. Fran Teague, Department of English
Room C	**Joe Fang**	Determination of Interferon Sensitivity of Wild-Type and Lab-Adapted Rabies Viruses
	Faculty Mentor	Dr. Zhen Fu, Department of Pathology
	Amanda Brouillette	Time Resolved Photoelectron Spectroscopy and the Photoprotective Properties of Adenine
	Faculty Mentor	Dr. Susanne Ullrich, Department of Physics & Astronomy
	Ammarah Mahmud	Harboring an Ancient Killer: Restructuring Malaria Control in Nigeria
	Faculty Mentor	Dr. Christopher Whalen, Department of Epidemiology
Room D	**Chadwick Peltier**	The Mixed Model of National Power and the Power Parity Between the United States and China
	Faculty Mentor	Dr. Brock Tessman, Department of International Affairs
	Aaron Sayama	The Ties That Bind: How the Notion of Strategic Culture and Technological Advances Affect China and U.S. Perception
	Faculty Mentor	Dr. Seema Gahlaut, Center for International Trade & Security
	Bethany McCain, Christopher Looft	The Elemental Problem in Grand Strategy: A Principle Model of Analysis
	Faculty Mentor	Dr. Brock Tessman, Department of International Affairs
Room G	**Nathaniel Edwards**	Civilian-Oriented Preparedness for Radiological Terrorism
	Faculty Mentor	Dr. Dmitriy Nikonov, Center for International Trade & Security

	Shayna Pollock	Forbidden Fruit: Reforming the Penalties for the Importation and Distribution of Contaminated Produce
	Faculty Mentor	Dr. Lewell Gunter, Department of Agricultural & Applied Economics
	Caroline Colden	The Temporal Distribution of the Vesicular Stomatitis Virus in Experimentally Infected Cattle: An Immunohistochemical Study
	Faculty Mentor	Dr. Corrie Brown, Department of Pathology
Room H	**Kathryn McCabe**	Increasing Personal Finance Education in Athens-Clarke County High Schools
	Faculty Mentor	Prof. Michael Rupured, Department of Housing & Consumer Economics
	Ellyn Echols	Affordable Housing in Athens-Clarke County: A Two-Pronged Approach
	Faculty Mentor	Dr. Russell James, Department of Housing & Consumer Economics
	Shanell Davis	Constructed Wetlands and Southeast Waste Water Treatment Policy
	Faculty Mentor	Dr. Ronald Carroll, Odum School of Ecology
Room I	**Joseph Rimando**	Respiratory Syncytial Virus G Protein Heparin-Binding Domain Interaction with Cell Surface Glycosaminoglycans Facilitate CX3C Chemokine Receptor Mimicry
	Faculty Mentor	Dr. Ralph Tripp, Department of Infectious Diseases
	Steve Hsieh	Generation of a Mutant Core Streptavidin for Complexation with and Crystallization of Biotinylated Membrane Proteins
	Faculty Mentor	Dr. Raquel Lieberman, Department of Chemistry & Biochemistry, Georgia Institute of Technology
	Sambita Basu	Optimization of Techniques for Identification and Analysis of N-Linked Glycans Derived from Various Glycoprotein Mixtures
	Faculty Mentor	Dr. Michael Pierce, Department of Biochemistry & Molecular Biology
Room J	**Thomas Bailey**	Corpus-Based Analysis of Other-Directedness in Japanese
	Faculty Mentor	Dr. William Kretzschmar, Department of Linguistics
	Kathryn Camp	A Georgia High School and Technical College Dual Degree Program
	Faculty Mentor	Dr. John Schell, Department of Workforce Education, Leadership & Social Foundations
	Elisabeth Bentley	Open Textbooks and the Innovation of Education
	Faculty Mentor	Dr. Richard Watson, Department of Management Information Systems

2:30 – 3:45 p.m. Fifth Concurrent Session

Classic Center, Athena Breakout Rooms A, B, C, D, G, H, J

Room A	**Krelin Naidu**	Epigenetic Effects of Bromate on p21 and Histone-2AX Expression in HEK293 Cells
	Faculty Mentor	Dr. Brian Cummings, Department of Pharmacology & Toxicology
	Malin Dartnell, Shanell Davis	Using the Public Value Mapping Model to Evaluate Groundwater Mining
	Faculty Mentor	Dr. Barry Bozeman, Department of Public Administration & Policy
Room B	**Leah Prestwood, Kiara Jones, Evin Winkelman**	The Impact of Speech Impairment on Head Start Children's Social Emotional Competence
		Dr. Tsu-Ming Chiang, Department of Psychology, Georgia College & State University
	Valerie Bidwell	Preschoolers' Understanding of Arrows as Directional Indicators
	Faculty Mentor	Dr. Janet Frick, Department of Psychology
	Juliet Allan	Building a Baby College in Athens-Clarke County
	Faculty Mentor	Dr. Diane Bales, Department of Child & Family Development
	Meaghan Kelly, Kristina Housworth, Robert Gentry	The Impact of Reading One-on-One to Head Start Children
	Faculty Mentor	Dr. Tsu-Ming Chiang, Department of Psychology, Georgia College & State University
Room C	**Jonathan Lee**	Renewable Biomass and Georgia: A Legislative Update
	Faculty Mentor	Dr. Robert Izlar, Center for Forest Business
	Rene Cieszewski	Delayed Reproduction and Age/Class Structure in a Randomly Varying Environment
	Faculty Mentors	Dr. Daniel Promislow, Department of Genetics
	Todd Pierson	Estimating Detection Rates and Determining Site Occupancy of *Urspelerpes brucei* (the Patch-Nosed Salamander)
	Faculty Mentor	Dr. John Maerz, Warnell School of Forestry & Natural Resources
	Kathryn Branscomb	Land Tenure Change in Africa
	Faculty Mentor	Dr. Bram Tucker, Department of Anthropology
Room D	**Emily Myers**	The Effect of U.S. Military Aid on Recipient State Cooperation in Pakistan: A Case Study
	Faculty Mentor	Dr. Patricia Sullivan, Department of International Affairs

	Laura McDonald	A New Definition of Treason: The 1794 Treason Trials
	Faculty Mentor	Dr. Kirk Willis, Department of History
	Irena Stevens	Promoting Sharing of OSINT Analysis Between Expert Institutions and the Intelligence Community
	Faculty Mentor	Dr. Loch Johnson, Department of International Affairs
Room G	**Jason Bowman**	Variability of Motion in Individuals with Ankle Instability During Single Leg Jump Landings
	Faculty Mentor	Dr. Cathy Brown, Department of Kinesiology
	Elodie Huguet	Effects of Steel and Aluminum Shoes on Forelimb Kinematics in Stock Horses
	Faculty Mentor	Dr. Kylee Duberstein, Department of Animal & Dairy Science
	David Kim	Ground Reaction Forces of Unicompartmental Knee Arthroplasty Patients During Stair Ascent
	Faculty Mentor	Dr. Kathy Simpson, Department of Kinesiology
	Jaharris Collier	The Effects of Spinal Fusion on the Physical Function of Females with Adolescent Idiopathic Scoliosis
	Faculty Mentor	Dr. Kathy Simpson, Department of Kinesiology
Room H	**Hannah Avram**	Nanotechnology: Science Meets the Apparel and Fashion Industry
	Faculty Mentor	Dr. Ian Hardin, Department of Textiles, Merchandising & Interiors
	Meagan Cauble	Dispersion of Single-Walled Carbon Nanotubes in Aqueous Solution
	Faculty Mentor	Dr. Marcus Lay, Department of Chemistry
	Shelby Hipol	The Multimethod Analyses of the Three Separated Parts of a Roman Sarcophagus with the Myth of Marsyas' Musical Contest with Apollo
	Faculty Mentor	Dr. Frances Van Keuren, Department of Art History
	Akanksha Rajeurs	Development of a Modified System to Create Mutations in *Mycobacterium tuberculosis*
	Faculty Mentor	Dr. Russell Karls, Department of Infectious Diseases
Room J	**Amar Mirza**	A Tail's Tale: ErbB Structure, Evolution, and Function
	Faculty Mentor	Dr. Natarajan Kannan, Department of Biochemistry & Molecular Biology
	Michael Burel	Derivation of Neural Progenitors from Induced Pluripotent Stem Cells
	Faculty Mentor	Dr. Steven Stice, Department of Animal & Dairy Science

Joanna Eldridge	Genomic Profiling of Ovarian Cancer Cells in Response to a Gonadotropin
Faculty Mentor	Dr. David Puett, Department of Biochemistry & Molecular Biology
Yu Taniguchi	DNA Methylation Related to Cancer
Faculty Mentor	Dr. Shaying Zhao, Department of Biochemistry & Molecular Biology

4:00 p.m. Welcome and Opening Session

Classic Center, Athena Ballroom E

Introductions and Welcome	Dr. David S. Williams, Director, Honors Program Professor Jere W. Morehead, Senior Vice President for Academic Affairs and Provost
Recognition of CURO Promising Scholars	Dr. Pamela B. Kleiber, Associate Director, Honors Program
Introduction of Keynote Speaker	Matthew Sellers, Managing Editor, Journal for Undergraduate Research Opportunities (JURO), 2009 CURO Summer Research Fellow
Keynote Address ***Conservation and the Global Search for Sustainability***	Dr. Peter Brosius, Department of Anthropology and Director, Center for Integrative Conservation Research
Excellence in Undergraduate Research Mentoring Awards	Dr. David C. Lee, Vice President for Research

5:00 p.m. Visual Art Exhibit

Classic Center, Grand Hall South (downstairs)

Daniel Cellucci	Remote Sensing as a Generative Tool in the Creation of Fine Art
Faculty Mentor	Prof. R. G. Brown, Department of Sculpture, Studio Foundations
Archil Japaridze	Abandon Hope All Ye Who Enter: The Solution to the Cartel Crisis in Mexico
Faculty Mentor	Dr. Sergio Quesada, Department of Latin American & Caribbean Studies

5:00 p.m. Science as Art*

Classic Center, Grand Hall South (downstairs)

Science as Art Poster #31	**Michael Burel**	Derivation of Neural Progenitors from Induced Pluripotent Stem Cells
	Faculty Mentor	Dr. Steven Stice, Department of Animal & Dairy Science

Science as Art Space #35	**Amar Mirza** Faculty Mentor	A Tail's Tale: ErbB Structure, Evolution, and Function Dr. Natarajan Kannan, Department of Biochemistry & Molecular Biology

5:00 p.m. Poster Presentations

Classic Center, Grand Hall South (downstairs)

Poster #1	**Melissa Erickson, Rebecca Parker** Faculty Mentor	Effects on Blood Flow Velocity and Arterial Diameter Produced by Compression Therapy Dr. Kevin McCully, Department of Kinesiology
Poster #2	**Rejina Pumachcharige** Faculty Mentor	Blood Velocity at Rest and After Ischemia Dr. Kevin McCully, Department of Kinesiology
Poster #3	**Elizabeth Callaway, Kristen Battles** Faculty Mentor	Evaluation of Physical Activity, Spasms, and Diet After SCI Dr. Kevin McCully, Department of Kinesiology
Poster #4	**Leslie McConnell** Faculty Mentor	Serum Vitamin D and Bone Structural Development in Young Adult Females: A Three-Year Prospective Study Dr. Richard Lewis, Department of Foods & Nutrition
Poster #5	**Benjamin Wheeler, Destinee Ingrao** Faculty Mentor	Heart Rate Plateau in Response to Exercise Follows Exponential Kinetics Dr. James Hargrove, Department of Foods & Nutrition
Poster #6	**Puja Chebrolu** Faculty Mentor	Factors Affecting Cardiovascular Disease in the Third World Dr. Alex Anderson, Department of Foods & Nutrition
Poster #7	**Abby Wong** Faculty Mentor	Habitats of West Nile Virus Competent Mosquitoes: The Effects of Urbanization in New York City Dr. John Drake, Odum School of Ecology
Poster #8	**Ashley Roden** Faculty Mentor	Biogeography of *Triatoma sanguisuga* on two Barrier Islands off the Coast of Georgia, USA Dr. Brian Forschler, Department of Entomology
Poster #9	**Edward Lilla** Faculty Mentor	Rce1p Transmembrane Topology Dr. Walter Schmidt, Department of Biochemistry & Molecular Biology
Poster #10	**Ariel Chan** Faculty Mentor	Effect of GIPC-GAIP Coexpression on LPA Induced Signaling in CHO-K1 Cells Stably Expressing the LPA1 Receptor Dr. Shelley Pence, Department of Pharmaceutical & Biomedical Sciences
Poster #11	**Yu Taniguchi** Faculty Mentor	DNA Methylation Related to Cancer Dr. Shaying Zhao, Department of Biochemistry & Molecular Biology

Poster #12	**Alice Weaver**	Involvement of DNA Damage Response Factors in the Proliferation of Cancer Cells
	Faculty Mentor	Dr. Michael Terns, Department of Biochemistry & Molecular Biology
Poster #13	**Mary Burriss**	*C. elegans* IDE: Gene Annotation and Ability of Protein to Cleave Aβ and a-factor
	Faculty Mentor	Dr. Walter Schmidt, Department of Biochemistry & Molecular Biology
Poster #14	**Samar Aldrugh**	Developing a Hybrid Molecule Aβ-a-factor to Study the Activity of IDE in Cleaving Aβ
	Faculty Mentor	Dr. Walter Schmidt, Department of Biochemistry & Molecular Biology
Poster #15	**Tiffany Hu**	Investigating a Novel Alternatively Edited Protein's Involvement in Mitochondrial DNA Maintenance
	Faculty Mentor	Dr. Stephen Hajduk, Department of Biochemistry & Molecular Biology
Poster #16	**Susan Klodnicki**	Pediatric Seizures in Larval Zebrafish
	Faculty Mentor	Dr. Patricia Wilson, Department of Mathematics & Science Education
Poster #17	**Fahad Khan**	Examining the Substrate and Inhibitor Properties of Protease Inhibitors and Statins with OATP Transport Proteins
	Faculty Mentor	Dr. Jason Zastre, Department of Pharmaceutical & Biomedical Sciences
Poster #18	**Maximilian Klein**	Investigating the Early Developmental Expression of Lysosomal Enzymes in Zebrafish
	Faculty Mentor	Dr. Richard Steet, Department of Biochemistry & Molecular Biology
Poster #19	**Craig Hayes**	MicroRNA let-7f Regulates STAT1 Activity in Human Lung Epithelial Cells
	Faculty Mentor	Dr. Ralph Tripp, Department of Infectious Diseases
Poster #20	**Patricia Mitchell**	Using miRIDIAN miRNA Mimics and Inhibitors for Evaluating the Contribution of Host miRNA Regulation of Respiratory Syncytial Virus (RSV) Replication
	Faculty Mentor	Dr. Ralph Tripp, Department of Infectious Diseases
Poster #21	**Natasha Lee**	Complementation of Chromosomal Deletions in Mycobacteria
	Faculty Mentor	Dr. Russ Karls, Department of Infectious Diseases
Poster #22	**Lindel Krige**	Coagulation Factors Involved in the Pathology of Placental Malaria
	Faculty Mentor	Dr. Julie Moore, Department of Infectious Diseases

Poster #23	**Johnathon Nolen**	Examination of Resuscitation-Promoting Factors in Potential Fish Pathogens in *Mycobacterium shottsii* and *M. pseudoshottsii*
	Faculty Mentor	Dr. Russell Karls, Department of Infectious Diseases
Poster #24	**Tatum Mortimer**	The Epidemiology of *Staphylococcus aureus* in Kentucky and Georgia from 1995 to 2003
	Faculty Mentor	Dr. Susan Sanchez, Department of Infectious Diseases
Poster #25	**Ariella Perry**	Identifying Human and Avian Influenza Binding Sites in Clam Tissue
	Faculty Mentor	Dr. Elizabeth Howerth, Department of Pathology
Poster #26	**Carla Rutherford**	Human Resistance to Infection by African Trypanosomes
	Faculty Mentor	Dr. Stephen Hajduk, Department of Biochemistry & Molecular Biology
Poster #27	**Nick Regenold, E. N. Foxhall III, S. Frimpong, O. Grey, M. Kallaoun, J. Mansour, N. Wang**	Primary Transmission of Salmonella Contamination in Poultry Meat
	Faculty Mentor	Dr. John Maurer, Department of Microbiology
Poster #28	**Claire Stice**	Effects of Weighing Protocol on Corticosterone Concentrations in Leghorn Chickens
	Faculty Mentor	Dr. Kristen Navara, Department of Poultry Science
Poster #29	**Emilia Tuck**	NCAMP-1: A Novel Host Danger Molecule in Catfish
	Faculty Mentor	Dr. Liliana Jaso-Friendmann, Department of Infectious Diseases
Poster #30	**Kelly Cummings**	Differentiation of Natural and Post-Vaccinal Canine Distemper Virus Encephalomyelitis
	Faculty Mentor	Dr. Scott Schatzberg, Department of Small Animal Medicine
Poster # 31	**Michael Burel**	Derivation of Neural Progenitors from Induced Pluripotent Stem Cells
	Faculty Mentor	Dr. Steven Stice, Department of Animal & Dairy Science
Poster #32	**Shuyan Wei**	Development of Consensus-Degenerate Hybrid Oligonucleotide Primers for Retroviral Discovery
	Faculty Mentor	Dr. Scott Schatzberg, Department of Small Animal Medicine
Poster #33	**Meagan Cauble**	Dispersion of Single-Walled Carbon Nanotubes in Aqueous Solution
	Faculty Mentor	Dr. Marcus Lay, Department of Chemistry

Poster #34	**Alexandra Walker**	Synthesis of a Robust Photoremovable Protecting Group for Photoactivation of Gene Expression
	Faculty Mentor	Dr. Timothy Dore, Department of Chemistry
Poster #36	**Stephen Thompson**	Application of Protein Interface Footprinting via Hydroxyl Radical Oxidation to Endopolygalacturonase II
	Faculty Mentor	Dr. Robert Woods, Complex Carbohydrate Center
Poster #37	**Nicholas Dallas, Michael McKain, James Leebens-Mack, Jeremy Rentsch**	Genetic Diversity of *Yucca filamentosa* and *Y. aloifolia* in Athens-Clarke County, Georgia
	Faculty Mentor	Dr. Wendy Zomlefer, Department of Plant Biology
Poster #38	**Zijing Guo**	The Mystery of Telomere Recombination in Normal Yeast Cells
	Faculty Mentor	Dr. Michael McEachern, Department of Genetics
Poster #39	**Kelly Darby**	Calcium Imaging of Nodose Ganglion Cells in Response to Gastrointestinal Signals: CCK and CP 55,940
	Faculty Mentor	Dr. Gaylen Edwards, Department of Physiology & Pharmacology
Poster #40	**John Taliaferro**	Novel Synergistic Inhibitors of Methicillin-Resistant *Staphylococcus aureus* (MRSA)
	Faculty Mentor	Dr. Timothy Long, Department of Pharmaceutical & Biomedical Sciences
Poster #41	**Laura Zeidan**	Creation of a Reporter Molecule That Will Identify the Pathway Used to Degrade Isoprenylated Molecules
	Faculty Mentor	Dr. Walter Schmidt, Department of Biochemistry & Molecular Biology
Poster #42	**Amarachi Anukam**	Creation of a Heme Biosensor
	Faculty Mentor	Dr. Harry Dailey, Department of Biochemistry & Molecular Biology
Poster #43	**Soumya Vaish**	Glutamate Dehydrogenase and Its Role in *Helicobacter pylori*
	Faculty Mentor	Dr. Robert Maier, Department of Microbiology
Poster #44	**Al W. Ray, III**	Epidemiology of *Salmonella enterica* Typhimurium in Songbirds in the Southeastern United States
	Faculty Mentor	Dr. Susan Sanchez, Department of Infectious Diseases
Poster #45	**Francisco Marrero**	Water Droplet Generation in Ferrofluid-Based Magnetorheological Fluid
	Faculty Mentor	Dr. Leidong Mao, Department of Engineering
Poster #46	**Amanda Brouillette**	Time Resolved Photoelectron Spectroscopy and the Photoprotective Properties of Adenine
	Faculty Mentor	Dr. Susanne Ullrich, Department of Physics & Astronomy

Poster #47	**Whitney Ingram**	The Scaling Relationship Between the Photocatalytic Decay Rate and Height of TiO2 Nanorods
	Faculty Mentor	Dr. Yiping Zhao, Department of Physics & Astronomy
Poster #48	**Sook Kyung Yoon**	The Effect of Online Communication and Social Support on Positive Emotion and Health Outcomes in Individuals Treated with Ileoanal Reservoir Surgery
	Faculty Mentor	Dr. Kimberly Clay, School of Social Work
Poster #49	**Barrett Gold**	Health Care Around the World
	Faculty Mentor	Dr. Brenda Cude, Department of Housing & Consumer Economics
Poster #50	**Ryan Jordan, Elizabeth Simpson**	How Broad Are Infants' Face Discrimination Abilities in the First Year of Life?
	Faculty Mentor	Dr Janet Frick, Department Psychology
Poster #51	**Sarah Hutcheson**	Relationships Between Features of Infant Vocalizations and Later Language Development
	Faculty Mentor	Dr. Suneeti Nathani Iyer, Department of Communication Sciences & Special Education
Poster #52	**Valerie Bidwell**	Preschoolers' Understanding of Arrows as Directional Indicators
	Faculty Mentor	Dr. Janet Frick, Department of Psychology
Poster #53	**Marianne English**	Energy Expenditure and Gain of Nut-Cracking in Wild Capuchin Monkeys (*Cebus libidinosus*) in Piauí, Brazil
	Faculty Mentor	Dr. Dorothy Fragaszy, Department of Psychology
Poster #54	**Jessi Crabbe, Madison Asef, Daniel Tim**	Macular Pigment and Its Relation to Body Fat Distribution
	Faculty Mentors	Dr. Billy Hammond, Department of Psychology
Poster #55	**Shan Elahi, Caroline Cates**	An Examination of Motivation for Medication Adherence in Pediatric Patients with Inflammatory Bowel Disease and Parents
	Faculty Mentor	Dr. Ronald Blount, Department of Psychology
Poster #56	**Hannah Barfield, Brittany Baker**	Effects of Witnessing Maternal Psychological Abuse Perpetration on Undergraduate Women's Abuse Perpetration
	Faculty Mentor	Dr. Joan Jackson, Department of Psychology
Poster #57	**Theodore Story**	Best Practices in Graduated Driver's Licensing
	Faculty Mentor	Dr. Don Bower, Department of Child & Family Development
Poster #58	**Rebecca Feistritzer**	The Effects of Stress-Induced Analgesia and Peripherally Administered Cannabinoid Receptor Antagonists on Formalin-Induced Pain Behavior
	Faculty Mentor	Dr. Andrea Hohmann, Department of Psychology

Poster #59	**Rachel Pocock**	Operation Span Task and the Ocular Motor Delayed Response Task
	Faculty Mentor	Dr. Jennifer McDowell, Department of Psychology
Poster #60	**Manouela Valtcheva**	Brain Activity Analysis of Good and Poor Performers During Inhibitory Eye Movements
	Faculty Mentor	Dr. Jennifer McDowell, Department of Psychology
Poster #61	**Laura Smart**	Awareness of Borderline Personality Disorder in a University Population
	Faculty Mentor	Dr. Rich Suplita, Department of Psychology
Poster #62	**Erin Hansen**	Effects of Daily Saccade Practice on Behavioral Plasticity in Schizophrenia
	Faculty Mentor	Dr. Jennifer McDowell, Department of Psychology
Poster #63	**Raha Sabet**	The Biggest Loser: Restoring Self-Control After Rejection
	Faculty Mentor	Dr. Michelle vanDellen, Department of Psychology
Poster #64	**William Jordan**	Shaped Like Steiner: Biodynamic Farmers of Southern Germany Enacting a Century-Old Tradition of Sustainability
	Faculty Mentor	Dr. Betty Jean Craige, Department of Comparative Literature
Poster #65	**Sara Day**	Digital Proliferation: Discerning New Literary Genres Spawned by Digital Technology
	Faculty Mentor	Dr. Elizabeth Davis, Department of English
Poster #66	**Archil Japaridze**	Abandon Hope All Ye Who Enter: The Solution to the Cartel Crisis in Mexico
	Faculty Mentor	Dr. Sergio Quesada, Department of Latin American & Caribbean Studies

6:15 p.m. Awards Ceremony

Classic Center, Parthenon Room

Presentation of CURO Summer Research Fellows, CURO Scholars, UGA Libraries Undergraduate Research Awards, and Best Paper Awards	Dr. Pamela B. Kleiber, Associate Director, Honors Program Ms. Caroline Barratt, Director, Miller Learning Center Library Commons Ms. Deborah Dietzler, Executive Director, UGA Alumni Association

*The Science as Art distinction denotes the interplay between science and art. Images were produced during the course of scientific research and chosen for their aesthetic excellence as well as scientific or technical interest.

The Office of the Senior Vice President for Academic Affairs and Provost and the Honors Program established the Excellence in Undergraduate Research Mentoring Award in 2001. This award recognizes faculty, departments, and programs devoted to outstanding research mentorship of undergraduate students. Awards will be presented at the CURO Symposium Awards Ceremony on Monday, March 29, 2010 at 4:00 p.m. in the Classic Center, Athena Ballroom E.

2010 Awards

Early Career Faculty Award
Dr. John C. Maerz, Assistant Professor, Warnell School of Forestry and Natural Resources

2009 Awards

Early Career Faculty Award
Dr. Brian S. Cummings, Assistant Professor of Pharmaceutical & Biomedical Sciences
Dr. Anna C. Karls, Associate Professor of Microbiology
Dr. Dawn T. Robinson, Associate Professor of Sociology

2008 Awards

Master Level Faculty Award
Dr. John J. Maurer, Professor of Population Health
Early Career Faculty Award
Dr. Walter K. Schmidt, Assistant Professor of Biochemistry & Molecular Biology
Program Award
Biomedical and Health Sciences Institute

2007 Awards

Master Level Faculty Award
Dr. Timothy Hoover, Associate Professor of Microbiology
Early Career Faculty Award
Dr. Steven Stice, Professor of Animal & Dairy Science

2006 Awards

Master Level Faculty Award
Dr. Patricia Hunt-Hurst, Associate Professor of Textiles, Merchandising & Interiors
Early Career Faculty Award
Dr. Rodney Mauricio, Associate Professor of Genetics
Graduate Student Award
Christopher Anderson, PhD candidate in Ecology
Graduate Student Recognition
Dawn Holligan, PhD student in Plant Biology

2005 Awards

Faculty Awards
Dr. Gary Barrett, Odum Professor of Ecology
Dr. Sidney Kushner, Professor of Genetics
Department Award
Department of Cellular Biology

2004 Awards

Faculty Award
Dr. William S. Kisaalita, Associate Professor of Biological & Agricultural Engineering

2003 Awards

Faculty Award
Dr. Jody Clay-Warner, Assistant Professor of Sociology
Department Award
Department of Microbiology
Dr. Duncan Krause, Department Head
Dr. Timothy Hoover, Undergraduate Coordinator
Program Award
The Pratt Laboratory of Plant Genomics and Bioinformatics
Dr. Lee H. Pratt, Professor
Dr. Marie-Michèle Cordonnier-Pratt, Senior Research Scientist

2002 Awards

Faculty Awards
Professor William D. Paul, Jr., Professor of Art
Dr. Katherine Kipp, Associate Professor of Psychology
Faculty Recognition
Dr. Susan Sanchez, Assistant Professor of Infectious Diseases
Department Award
Department of Biochemistry & Molecular Biology
Dr. J. David Puett, Department Head
Program Award
"Physics Beyond the Boundaries": National Science Foundation, REU Program
Dr. Loris Magnani, Principal Investigator, Professor of Physics & Astronomy
Dr. Heinz-Bernd Schuttler, Professor and Department Head of Physics & Astronomy
Dr. Jonathan Arnold, Professor of Genetics
Dr. Susmita Datta, Professor, Georgia State University
Dr. David Logan, Professor, Clark Atlanta University
Dr. William Steffans, Professor, Clark Atlanta University

2001 Awards

Faculty Award
Dr. Marcus Fechheimer, Professor of Cellular Biology

Faculty Recognition
Dr. David MacIntosh, Associate Professor of Environmental Health Sciences
Dr. Dean Rojek, Associate Professor of Sociology

Department Award
Department of Genetics
Dr. John MacDonald, Department Head and Professor

Program Award
Savannah River Ecology Laboratory
Dr. Paul Bertsch, Director

Graduate Student Reviewers for CURO 2010 Symposium

Ibrahim Aljuffali	Pharmaceutical & Biomedical Sciences
Michael Amlung	Psychology
Lauren Anderson	Infectious Diseases
Mollie Barnes	English
Ashley Barr	Sociology
Sonja Brannon	Entomology
Melissa Bright	Psychology
Adela Chen	Management Information Systems
Rebecca Cheney	Lifelong Education, Administration & Policy
Rich Christiana	Health Promotion
Melinda Cro	Romance Languages
Jayna DeVore	Warnell School of Forestry & Natural Resources
Jon Gabbard	Infectious Diseases
Jim Gigantino	History
Rachel Han	Psychology
Cassandra Heighington	Cellular Biology
Ren Hullender	Art Education
Erik Jacobson	Mathematics & Science Education
Marina Klimenko	Psychology
Yinzhi Lai	English
Lincoln Larson	Warnell School of Forestry & Natural Resources
Tina Latham	Health Promotion
NaJuana Lee	Art Education
Su Yee Lim	Entomology
Ben Liu	Management Information Systems
Jennifer Malto	History
Mitch McCoy	Romance Language
Victoria Meliopoulos	Infectious Diseases
Erica Miller	Microbiology
David Nelson	Statistics
Jenna Oberstaller	Genetics
John Parmer	Health Promotion
Polly Reid	English
Katie Robbins	Food Science & Technology
Elizabeth Simpson	Psychology
Jennifer Sinclair De Mello	Chemistry
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Thesis Roundtable Facilitators

Dr. Jeanne Barsanti	Emerita Scholar, Veterinary Medicine
Dr. Carl Bergmann	Assistant Vice President for Research
Dr. Nancy Canolty	Emerita Scholar, Family and Consumer Sciences
Dr. Sylvia Hutchinson	Emerita Scholar, Reading Education and Higher Education
Dr. Ronald Simpson	Emeritus Scholar, Science Education

Thesis Roundtable Conveners

Maria de Rocher	Honors Program staff
Jessica Hunt	Honors Program staff
Matthew Jordan	Honors Program staff
Lara Pacifici	Honors Program staff
Martin Rogers	Honors Program staff
Troy Smith	Honors Program staff

Demystifying the Conflict Culture: Understanding the Effects of Zero Tolerance on Students in a Georgia Disciplinary Alternative Education Program

Jeremy Akin
Dr. Larry Nackerud, School of Social Work, University of Georgia

The students impacted by exclusionary discipline policies—e.g., suspension, expulsion, and/or placement at alternative schools—comprise an ever-increasing population in Savannah-Chatham County Public Schools. Over the past several years, fighting remained the number-one cause for suspensions and expulsions, and the recent 78 percent increase in students at the local alternative program over just four months in 2008 raises questions as to the long-term effects of the school system's current application of "zero-tolerance." Problems surrounding overcrowding, recidivism, and juvenile prison rates highlight a great need to understand and include students in the development of programs that affect them and, indirectly, society at large. Through interviews and surveys of students, parents, faculty, and administrators in the public school system, this study conducted between January and March 2010 sheds light on the following questions: What are the root causes of the "conflict culture"—defined as the social code that says fighting is the only viable means for peace—and how can these be addressed? Furthermore, how does the zero-tolerance strategy impact the conflict culture within local public schools? Results from each interview and survey have been summarized, catalogued, and analyzed via basic descriptive and correlational statistics. For quantitative data, frequency distributions and correlations were developed. Research findings will be made available to system administrators and will inform the curriculum of a peer mediation program in which students at seven area high schools mediate real-life conflicts involving their classmates.

Effect of Cation Chelators on Biofilm Formation in a Prolific Versus Non Prolific Biofilm Forming Strain of *Listeria monocytogenes*

Christine Akoh – CURO Apprentice
Dr. Joseph Frank, Department of Food Science & Technology, University of Georgia

The mechanisms involved in *Listera monocytogenes* biofilm formation are largely unknown. Previous studies involving other bacterial pathogens suggest cations contribute to biofilm formation. The goal of this study was to provide insight into some of the external factors that enable efficient biofilm formation and persistence of *L. monocytogenes* on food processing surfaces. This study determined the effect of the cation chelators EDTA and EGTA, a calcium specific chelator, during biofilm formation on stainless steel surfaces by *L. monocytogenes* strain 311 (prolific biofilm former) and ATCC 19115 (poor biofilm former). Epifluorescent microscopy was used for visualization and quantification of the biofilms, and bacterial counts were obtained using the spread plate method. Microscopy results indicated that the presence of 30 mm of the cation chelators EDTA and EGTA completely inhibited bacterial growth and attachment when added initially and after 6hr of biofilm growth. Chelating cations in the growth medium appeared to enhance biofilm formation once biofilms had formed after 24 or 48 hours. Plate counts showed 2-3 log decreases in bacterial growth of both strains following the addition of EDTA initially and after 6hr and 3-4 log decreases following the addition of EGTA but no significant difference after 24 and 48 hours. Collectively, the data suggest that cations, especially calcium, play an important role in bacterial attachment and the subsequent biofilm formation. The information obtained from this study will provide insight into the external factors that enable effective and efficient biofilm formation in *L. monocytogenes*. This information can then be used as a tool to formulate effective intervention strategies against this pathogen of extreme importance.

Television News Coverage of the 2010 Tea Party: A Niche for Everyone?
Jessica Alcorn – CURO Apprentice
Dr. Audrey Haynes, Department of Political Science, University of Georgia

During its dominance, television news was viewed as a relatively homogenous product, catering and marketing to a rather large audience. However, as new forms of media challenged broadcast, primarily satellite and cable, and the major networks fought to retain their audience level, observers noted that "news" was changing. Simply the introduction of greater competition, competition that seemed to target a particular slice of the market, changed the nature of news. Many scholars began to discuss news as filtered through a prism, rather than a "fair and balanced" representation of "all you need to know." I will attempt to test this theory of niche news by analyzing the coverage of a politically charged event, the Tea Party Convention. If this hypothesis is true, the expectation is that coverage among the major news outlets (ABC, CBS, NBC, FOX News, MSNBC, and CNN) will differ significantly in their presentation. In the end, I expect variation in 1) how the Convention is framed, 2) how much attention is given to the event, and 3) the positive and negative connotations of the words used to describe the event. I will conduct a content analysis of news transcripts from the days immediately surrounding the convention according to particular variables, such as sources, ideological bias, and attention. Most of the data analysis will be descriptive, with quantitative support from correlation and cross-tabulation analysis. My expectation is a confirmation of the niche hypothesis. News no longer represents reality but rather reality through a particular market perspective.

Developing a Hybrid Molecule Aβ-a-factor to Study the Activity of IDE in Cleaving Aβ
Samar Aldrugh
Dr. Walter Schmidt, Department of Biochemistry & Molecular Biology, University of Georgia

Alzheimer's disease (AD) is an irreversible, progressive neurodegenerative disease. One of the neuropathological hallmarks of AD is the accumulation of extracellular aggregates of Aβ peptides. Aβ peptides are generated via two-step proteolytic cleavage of a transmembrane protein (APP). Aβ (1-42) peptides are highly fibrillogenic, thus they are associated primarily with AD. Aβ is one of multiple substrates cleaved by insulin degrading enzyme (IDE). Expression of IDE in yeast promotes maturation and production of the a-factor mating pheromone, in the absence of the yeast enzymes, Ste23p and Axl1p. This observation indicates that the a-factor mating pheromone is a substrate of IDE. IDE cleaves Aβ between F19 and F20, thus we are interested in fusing Aβ (1-19) sequence to the mature a-factor. Our goal is to construct a yeast model as a tool to study the activity of IDE in cleaving Aβ. We hypothesize that a fusion between Aβ (1-19) sequence and the mature a-factor sequence should render a hybrid protein that is cleavable by IDE. This fusion is created via recombination cloning. We anticipate that if IDE is able to cleave Aβ-mature a-factor fusion, mating will take place, thus linking the production of Aβ to mating in yeast. The mating efficiency in yeast will be tested via mating assays. Using a yeast model to study the activity of IDE in cleaving Aβ is expected to be more cost effective than using a mouse model. These findings will advance our knowledge and understanding of Alzheimer's disease and guide potential therapeutic strategies.

Building a Baby College in Athens-Clarke County
Juliet Allan – Roosevelt at UGA
Dr. Diane Bales, Department of Child & Family Development, University of Georgia

Children in Athens-Clarke County (ACC) disproportionately live in households characterized by a low household income, a single parent, or parents with low levels of academic achievement. Nationally, these household demographics are correlated with high dropout rates and with grades and test scores below the national average. Relevant

Athens statistics illustrate that student performance falls below national standards. The academic struggles of many Athens children are partially attributable to the deficit of responsive parenting that is correlated with at-risk households. Scientific research demonstrates that during the early years of a child's life, responsive parenting supports children's language, cognitive, and social-emotional development. Delays in these cognitive development areas have long-lasting academic repercussions, such as low test scores, grade repetition, increased likelihood of dropping out of high school, lasting literacy struggles, and low wages. This paper proposes that Athens-Clarke County implement a "Baby College," which provides responsive parenting workshops for at-risk families in ACC. Studies at universities across the country indicate that early childhood intervention results in tangible improvements in at-risk children's academic performance. A systematic analysis of this research reveals that both center-based enrichment programs, such as Early Head Start, and improvements in the home environment are necessary for a maximum improvement in students' academics. ACC already provides strong center-based enrichment programs for at-risk children, and a "Baby College" would address the home environment component of intervention, complementing existing Athens programs. Finally, to ensure effectiveness, the program would coordinate with faculty at UGA and ACC community leaders for program evaluation and curriculum design.

Designing an Efficient and Effective Cap-and-Trade System

Juliet Allan – Roosevelt at UGA
Dr. Jeff Mullen, Department of Agricultural & Applied Economics, University of Georgia

Cap-and-trade represents a promising policy for reducing greenhouse gases and slowing the rate of climate change. The basic premise of cap-and-trade is a cap on carbon emissions that becomes increasingly strict over time. The cap is enforced by distributing allowances to emitters of carbon dioxide and punishing those who pollute without an allowance. An economic analysis of proposed cap-and-trade legislation, other cap-and-trade systems, and academic research on climate change policies reveals that a break from the traditional formula would improve the efficiency of the system and reduce its costs to the United States' economy. An upstream and economy-wide system would cap the amount of carbon-producing substances (such as oil, coal and gas) produced in or imported into the country as opposed to a cap on emissions. Upstream regulation allows for easier monitoring, reduced administrative costs, universal coverage of emissions in the country, and greater stability in the allowance market. Furthermore, an EPA-run auction of allowances, as opposed to free distribution, avoids windfall profits by carbon-intensive industries and would allow a redistribution of auction proceeds to American consumers. Methods for appropriate regulation of the auction, scientifically based reduction goals, and components such as offsets and banking of allowances are also discussed as ways to further increase the efficiency of the system. An efficient design of a cap-and-trade system is critical in minimizing short-term transition costs and ensures that the long-term benefits of improved air quality, technological innovation, and slowing climate change outweigh these costs in a cost-benefit analysis.

Creation of a Heme Biosensor

Amarachi Anukam – CURO Apprentice
Dr. Harry Dailey, Department of Biochemistry & Molecular Biology, University of Georgia

As a cofactor in gas-binding and electron transport proteins, heme is a vital molecule. Heme is also an important ligand for a number of regulatory proteins. Presently there is no way to determine heme concentrations in small samples, cells, or tissues. Using protein biosensors, it will be possible to detect and assess heme fluctuations. It would be beneficial to have a sensor that would permit us to detect cellular and tissue distribution of heme so that we can begin to understand heme transfer and heme fluxes in response to physiological stimuli. In addition, we would be able to follow heme distribution and flux during embryonic development. The protein Serratia marcesens

HasA was used to create the biosensor. The HasA DNA was replicated using PCR. The protein was then purified. Protein purification proved to be difficult. The best method found to purify the protein was to transform the protein into BL21 cells, grow the cells overnight, induce cells with IPTG, and allow cells to grow for another 3-4 hours. In the future, a better method will be found to purify the protein, after which, HasA will be expressed through protein expression.

Nanotechnology: Science Meets the Apparel and Fashion Industry

Hannah Avram
Dr. Ian Hardin, Department of Textiles, Merchandising & Interiors, University of Georgia

Nanotechnology is a relatively new and rapidly emerging science with tremendous potential. Nanotechnology aims to manipulate molecular matter—measured in billionths of a meter—to develop materials or devices. Applied properly, it may be able to improve quality of life in previously unimaginable ways, and create exciting commercial opportunities—opportunities that include the fashion industry. This research examines the potential uses of nanotechnology in the apparel and fashion worlds, and explores the risks that inevitably occur when dealing with molecules on this small scale (e.g., health issues). Part of the research will be to visit labs with nanotechnologists on the UGA campus to better understand the nature of nanotechnology treatments that can be applied to materials. Apparel and fashion companies that currently use nanotechnology will be contacted to discuss the products and processes they use, and the market potential they see. I am contacting retailers, presenting them with my findings, and determining their interest in selling products treated with or developed by the use of nanotechnology. In summary, my research assesses the current and future applications of this groundbreaking science, its fashion market potential, the risks that could pose barriers to its development, and ways to mitigate those risks. My conclusions will provide a more complete understanding of the nanotechnology opportunities in the apparel and fashion industries and evaluate the potential that nanotechnology has for our future.

Familial Predictors of Young Adult Romantic Relationship Functioning: A Closer Look at Boundary Dissolution

Emily Baggett – CURO Scholar
Dr. Anne Shaffer, Department of Psychology, University of Georgia

There is a large body of empirical evidence supporting the idea that early experiences within the family can impact one's romantic relationship functioning during young adulthood. Many studies have investigated the role of attachment in these associations. The current study proposes to look beyond attachment style to see how other familial factors might affect romantic relationship outcomes. Specifically, we will investigate the relationships between general parenting styles and experiences of parental boundary dissolution growing up and one's recent experiences within a romantic relationship. Drawing from findings of Shaffer and Sroufe (2006), we expect that childhood experiences of boundary dissolution—the disintegration of normal parent-child roles in which the child fulfills the parent's emotional needs to an inappropriate degree (e.g., parentification, role-reversal, enmeshment)—will predict romantic relationship outcomes over and above the variance explained by general parenting. Because the literature indicates that experiences with mothers and fathers can have distinct influences for sons and daughters, we will explore possible moderating effects of gender, both the parent's and the child's, on these associations. Participants include 800+ undergraduate students who will complete online questionnaires about their experiences growing up and their current feelings within a romantic relationship. We are currently collecting data through the web site Survey Monkey. Data will be imported into SPSS 15.0 and analyzed first with bivariate correlations and then hierarchical regressions. General parenting style is measured by the authoritative subscale of the Parental Authority Questionnaire. Parental boundary dissolution is ascertained by the

enmeshment subscale of the Parental Boundary Scale. Romantic relationships outcomes include measures of security, satisfaction, disclosure, and idealization.

Corpus-Based Analysis of Other-Directedness in Japanese

Thomas Bailey
Dr. William Kretzschmar, Department of Linguistics, University of Georgia

A characteristic traditionally attributed to Japanese discourse by qualitative research is "other-directedness." While this qualitative approach is not itself a problem, it is the responsibility of scholars to verify previous research. To this end, I sought to *quantitatively* evaluate this claim, as well as develop a concrete understanding of "other-directedness." I compiled two comparable corpora, both comprised of interviews freely available online. One corpus contained interviews with Japanese-speaking musicians, the other with English-speaking musicians (for comparative purposes). The interviews with Japanese musicians had been translated into English when published. I used three methods of comparison: investigation of normalized word frequencies, collocate analysis (examination of what words frequently occur near one another), and direct scrutiny of context through concordancing software, after which I assigned words into context categories and examined the numerical distributions thereof. Four language use patterns characteristic of "other-directedness" were found when comparing the Japanese musician interviews with the English-language corpus: formality, manifested in scarcity of contractions and increased use of polite language (especially fixed phrases); presence of private predicates, demonstrated by the verbs found most often near *I, we,* and *you*; humility, shown by the rarity of positive words near words relating to the musicians' in-groups; and finally, the importance of the group, exemplified in the presence of certain pronouns near *please*. This research is significant because it assesses accepted beliefs about Japanese speech, which impact wider attitudes toward the Japanese themselves. Furthermore, understanding of Japanese communication has significant implications for international business, where miscommunications are disastrous and costly.

I Do, but I Don't: The Politics of Dress in Gay and Lesbian Commitment Ceremonies in the United States

Caylee Bale
Dr. Katalin Medvedev, Department of Textiles, Merchandising & Interiors, University of Georgia

This paper explores the dress practices of gay and lesbian celebrants at commitment ceremonies. Dress includes all body modifications and body supplements that adorn a person. Homosexual celebrants' commitment dress not only carries deep personal meanings for the celebrants but also acts as a powerful means of nonverbal communication to the society. With the aid of numerous scholarly and popular resources, I conducted a systematic analysis of the dress practices of commitment ceremonies in the United States. While unable to use homosexual couples as a primary resource, I used secondary resources such as photographs and first-person stories to analyze the meanings of their ceremony dress. From my analysis, I have concluded that the commitment ceremony dress worn by the celebrants is a common form of expression for homosexual couples that represents three different social and sartorial scripts: conformity, rebellion, and social reformation. In conformity commitment ceremonies, the celebrants strive to dress in a way in which they will gain acknowledgement from the overall society as a legitimate couple. Therefore, they choose to conform to American social norms in their dress. In contrast, celebrants of rebellious commitment ceremonies deliberately defy the dress stereotypes of American society through the use of a drag costume or non-mainstream wedding dress elements. Finally, new and old dress traditions mesh when a social reformation commitment ceremony is held. Each commitment ceremony dress has its own unique, personal characteristics. However, by conveying one of these three themes, homosexual couples are dressing their bodies not only to celebrate their

commitment to each other but also to express a political stance. Each commitment dress style expresses a strong desire for equal marriage rights for gays and straights alike. The three different social/sartorial scripts—conformity, rebellion and social reformation—showcase three different ways of fighting for social acceptance and represent distinct paths for changing the definition of the institution of marriage in the United States.

Effects of Witnessing Maternal Psychological Abuse Perpetration on Undergraduate Women's Abuse Perpetration

Hannah Barfield & Brittany Baker
Dr. Joan Jackson, Department of Psychology, University of Georgia

Previous research indicates that children who witness domestic violence experience detrimental consequences. The present study examined how witnessing parental psychological abuse perpetration affects undergraduate women. Based on same sex modeling, we hypothesized that women who witnessed maternal psychological abuse perpetration during childhood would be more likely to perpetrate psychological abuse in their dating relationships. Women's perpetration of psychological abuse was measured using the Psychological Maltreatment of Women Inventory (PMWI). Exposure to parental perpetration of psychological abuse was measured by a composite of items used in prior research (Cronbach's α maternal perpetration = .91; α paternal perpetration = .94). In a sample of 167 undergraduate women, results of a multiple regression analysis indicated that exposure to paternal and maternal psychological abuse perpetration predicted women's emotional/verbal abuse perpetration in their dating relationships (accounting for 4% of variance), $F(2,166) = 3.57$, $p = .03$. As expected, maternal perpetration emerged as a unique predictor in the model ($\beta = .19$, $p < .05$), and paternal perpetration was not significantly associated ($\beta = .02$, $p = .81$). Witnessing parental psychological aggression did not predict women's psychological aggression as measured by the dominance/isolation subscale of the PMWI (model $p = .65$). In sum, witnessing maternal abuse perpetration was only associated with women's perpetration of verbal/emotional abuse. Although the effect was small, findings from this study provide qualified support for the modeling hypothesis and help explain the understudied phenomenon of women's violence and its consequences for children.

Optimization of Techniques for Identification and Analysis of N-linked Glycans Derived from Various Glycoprotein Mixtures

Sambita Basu – CURO Summer Research Fellow
Dr. Michael Pierce, Department of Biochemistry & Molecular Biology, University of Georgia

The discovery that carbohydrates, in addition to gene sequences and proteins, serve as significant biomarkers presented important possibilities for the diagnosis and subsequent treatment of several diseases, such as mucolipidosis, muscular dystrophy, and cancer. Glycoproteomic analysis of serum has led to increased understanding of the development and detection of hepatocellular carcinoma. Efficient glycan identification can provide diagnostic tools and continue education of disease progression. The focus of my research was to optimize techniques for the identification and analysis of glycans from various glycoprotein mixtures. My experimentation involved 1) releasing and extracting N-linked glycan moieties from six mixtures with different proportions of ovalbumin and alpha 1-acid glycoprotein, 2) purifying the released glycans efficiently [purification techniques included solid phase extraction techniques with C-18 or graphite phases to separate glycans from detergents (or other interfering substances) from earlier cleavage stages], 3) permethylating the oligosaccharides for analysis by Maldi-Tof Mass Spectrometry, and 4) completing deuterium exchanges on the six samples for a better detection of anomeric signals by proton nuclear magnetic resonance (NMR) spectroscopy. Through analysis, I tried to determine whether my modifications to established glycoprotein identification techniques were successful. In addition to glycan purification, my research also

involved optimization of an existing peracetylation technique, which I used on egg yolk oligosaccharide samples, the ovalbumin/alpha 1-acid glycoprotein samples processed before, and human milk oligosaccharide samples to aid in the identification of different glycan moieties by NMR spectroscopy.

Open Textbooks and the Innovation of Education

Elisabeth Bentley
Dr. Richard Watson, Department of Management Information Systems, University of Georgia

This project focuses on discovering the academic, monetary, and social benefits of open textbooks, which are free digital textbooks provided digitally that can be remixed and edited by their adopters. The University of Georgia's Global Text Project serves as a model of an open textbook initiative for developing economies. The purpose of the research and its corresponding article is to determine the importance of open textbooks to university students, professors, and librarians and provide insights into effective practices for librarians in providing and disseminating information about such resources. Our research consisted of reviewing existing literature on the nascent field of open educational resources, conducting a focus group of university librarians, and interviewing the founder of the Global Text Project, Dr. Richard Watson, on how his initiative exemplifies the opportunities open textbooks provide to universities in developing countries. The resulting paper establishes the case for librarians in developing economies to take a leading role in deploying and managing open textbooks.

Preschoolers' Understanding of Arrows as Directional Indicators

Valerie Bidwell
Dr. Janet Frick, Department of Psychology, University of Georgia

Arrows are commonly used as directional indicators for both adults and children. Research has found that children are cued to look faster when cued by valid vs. invalid arrows. Yet, for such a common directional symbol, it is still largely unknown how children understand this directional indicator. They may be attending to the symbolic meaning of the arrow, or perhaps children are cued by more perceptual aspects like the visual weight of the arrow. This study presented 34 children with ten arrow stimuli that differed in direction and distribution of weight. We asked the children to use the arrow cue to find a hidden animal and recorded their eye movements as they were exposed to the various stimuli. Our results indicated that, on average, children three years and older were cued to look to the side indicated by the weight of the arrow but not to the side indicated by the direction. Children younger than three years of age were not cued by the weight or the direction of the arrow. These findings are consistent with past research on this topic and suggest that, though children at this age are cued by arrows, they may not necessarily be attending to the symbolic meaning arrows denote. These results demonstrate how perceptual processes can act as a foundation for the development of cognitive abilities like understanding written language and other abstract symbols.

Femininity, Freakishness, and Despair in the Novels of Harry Crews

Charles Blackburn – CURO Scholar, CURO Summer Research Fellow
Dr. Hugh Ruppersburg, Department of English, University of Georgia

This presentation will address several novels by the Georgia-born writer Harry Crews. *Karate Is a Thing of the Spirit*, *Feast of Snakes*, and *Body* each involve comparable female characters and potentially anti-feminist commentaries. Whether the author intends to convey anti-feminist messages or merely to depict faithfully the attitudes of the male, "grit" inhabitants of the Wiregrass Region of southern Georgia and northern Florida remains unsettled in critical accounts. Absent from criticism is explicit analysis of the contribution of female characters to a larger theme of the loss of the traditional, agrarian South and, by extension, to a theme of

existential despair. Previous criticism also fails to explore a connection between women and another class of characters, Crews's freaks. It is possible that women and freaks perform similar roles in the novels and make similar contributions to the author's vision of modernity and fiction writing. Crews has said, "freaks are human beings who happen to be 'enterable.'" How does Crews access character through physical appearance? What problems arise from this approach? This presentation will attempt to establish new connections between issues formerly explicated independently and, in turn, to shed new light on the debate over anti-feminism in Crews's fiction.

The Impact of Single-Parents and Their Disciplinary Strategies on Childhood Aggression

Andrea Borders, Blair Morton, Erin Gilstrap & Lauren Heard
Dr. Tsu-Ming Chiang, Department of Psychology, Georgia College & State University

Current research on childhood aggression has shown significant relationships between the quality of maternal relationships and reporting external aggression in children during early childhood. Studies have shown that more aggressive and delinquent behavior is exhibited by children raised in single-parent homes than in two-parent homes. In studies of aggression in children, little evidence has been found to establish a relationship between the qualities of the parental relationship with the child to the likelihood of the child displaying excessive aggression. Furthermore, the few studies on relationships between children and their fathers are largely from middle-class samples, where the fathers are more likely to be married and committed to the child's mother. This study will examine the father-child relationship that exists in a different socioeconomic class since many of the children in this study do not reside within a two-parent home, or more frequently lack paternal guardianship. Therefore when investigating the results, the majority of children were raised by single mothers. This study examines whether externalized aggression was influenced by the absence of a second guardian. In addition, parental disciplinary strategies and their effects on children's aggression were assessed. The data were collected from the local Head Start program in the southeastern U.S. Data consist of parental surveys and teachers' social/emotional evaluations using the SCBE form developed by Peter LaFreniere. The presentation will include discussion of the differences that were found in the data between boys and girls in displaying emotions and aggressions.

Feeding the Energy Supply: The Market for Biodiesel in Costa Rica

Christy Boudreau
Dr. Rebecca Moore, Warnell School of Forestry and Natural Resources, University of Georgia

This study investigates the financial feasibility of producing biodiesel at the University of Georgia campus in Costa Rica. The study examines biodiesel, not ethanol, because the campus vehicle fleet is run on diesel fuel, not gasoline. Palm oil is the feedstock of interest because it is recognized as an efficient fuel source in government policy, produced on a national level, and traded on international exchanges. Life cycle analysis indicates that jatropha and algae may prove to be more efficient feedstocks, but energy yields are not known with certainty, and further investigation into these feedstocks is beyond the scope of this project. The qualitative aspects of the biodiesel market are emphasized, but attempts are made to quantify biodiesel costs and benefits. A *pro forma* income statement is constructed for a hypothetical refinery. The biodiesel project is evaluated using a flow-to-equity discounted cash flow analysis, and an internal rate of return is calculated. According to this model, the net present value (NPV) of a $640,000 equity investment in the hypothetical biodiesel refinery is $145,087. Hence, UGA stakeholders will be advised against investing (today) in the construction and operation of a biodiesel plant and, therefore, will not suffer the losses of an unprofitable investment. Breakeven analysis shows that a small per-gallon tax credit could shift the project's NPV into positive territory, however, so if society values the environmental

benefits of biodiesel consumption, the populace could subsidize the industry to make production economically feasible.

Variability of Motion in Individuals with Ankle Instability During Single Leg Jump Landings

Jason Bowman – CURO Apprentice
Dr. Cathy Brown, Department of Kinesiology, University of Georgia

Chronic ankle instability is a common condition prevalent in athletes and physically active individuals. Variability of motion may play a role in the development of ankle instability. The purpose of this study was to determine if there were significant differences in the coefficient of variation at the ankle, knee, and hip in three planes of motion during an anterior single leg jump landing. Eighty-eight participants were divided into four groups based on injury pathology criteria: mechanical ankle instability (MAI), functional ankle instability (FAI), copers, and controls. Participants wore reflective markers and performed 10 single leg landings while their joint motions and landing forces were measured. The coefficients of variation were calculated for each joint motion, a natural log transformation was performed on the data, and a one-way ANOVA tested for significant differences among groups with Tukey post-hoc testing at $\alpha = .05$. The control group demonstrated significantly greater variability (4.5 ± 1.2) than the FAI ($3.8 \pm .5$) and MAI ($3.8 \pm .6$) groups in hip frontal plane motion and than the FAI group in hip sagittal plane motion (4.3 ± 1.2 vs. $3.6 \pm .4$, respectively). The control group had significantly greater variability ($2.5 \pm .6$) than the coper group ($2.1 \pm .4$) in ankle frontal plane motion. Centrally mediated changes in lower extremity motion may cause individuals with chronic ankle instability to display limited joint motion variability during landing. A lack of flexible landing strategies may cause development of ankle instability and perpetuate the injury. Movement variability re-training at the hip, knee, and ankle may be an important component of rehabilitation following ankle injury.

Land Tenure Change in Africa

Kathryn Branscomb
Dr. Bram Tucker, Department of Anthropology, University of Georgia

Contemporary economic development in Africa has tremendous implications for the continent's myriad indigenous land tenure systems. These systems have been evolving in response to changes in culture and economy for as long as people have carved out places for themselves on Earth. This paper argues that the privatization of land in Africa as part of economic development policies is incongruous with indigenous African land tenure and has inadvertent consequences for the land and people. The paper draws its conclusions from a breadth of studies by anthropologists and social scientists. Their arguments were analyzed and synthesized to investigate common characteristics of indigenous land tenure that are being impacted by development. The characteristics that do not mesh with privatization include the role of social hierarchy in determining people's level of access to the land, the multiplicity of rights to the same land, and tolerated ambiguity in land titles. The paper reveals the challenges of introducing foreign economic concepts into well-established cultural systems and compares formal neoclassical economics with substantivist views that economy is embedded in culture. It is difficult to gauge local peoples' reactions to the changes; the complexity of the impact on stakeholders' adds another dimension to the issue. As new paradigms change the basic economic goals of Africans, land tenure systems must adapt to these new economic goals and encompass the way a particular people approach the land.

Not So Pretty: The Need for Cosmetics Regulation Reform

Jenny Brickman – Roosevelt at UGA
Dr. Jeffrey Fisher, Department Environmental Health Science, University of Georgia

Cosmetics represent a wide variety of products that are used by most, if not all, Americans. Even though 70 percent of chemicals placed on the skin can enter the bloodstream, the FDA

does not have the authority to ensure that the chemicals in cosmetics products on the market are safe for consumers. Due to this lack of government oversight, the U.S. relies on consumers to regulate the cosmetics industry. However, the lack of an adequate regulatory system has permitted the use of harmful toxins, such as carcinogens and neurotoxins, in cosmetics products that have the potential to cause negative health outcomes for Americans. This paper proposes that Congress create a new branch of the FDA, the Center for Cosmetics Evaluation and Research (CCER), to oversee cosmetics safety. The CCER will review and evaluate all existing cosmetics ingredients to ensure the safety of products on the market. The CCER will also create toxin-testing standards to test all new cosmetics ingredients. Finally, the CCER will review and evaluate all of these new ingredients for safety before use in products on the market. This will improve health outcomes for Americans by removing dangerous toxic ingredients from cosmetics. Based on the E.U. extended impact assessment of the Commission proposal for REACH (Registration, Evaluation, Authorization, and Restriction of Chemical Substances), a program to regulate the chemicals used by various industries, the health benefits of this proposed legislation can be estimated at 60 to 183 billion dollars over a 30-year generation from the reduction in cancer rates alone. Additionally, this legislation could make America's workforce more productive. A proper cosmetics regulation system is needed in the U.S. to improve health outcomes for Americans.

Time Resolved Photoelectron Spectroscopy and the Photoprotective Properties of Adenine

Amanda Brouillette
Dr. Susanne Ullrich, Department of Physics & Astronomy, University of Georgia

Pump-probe time-resolved photoelectron spectroscopy (TRPES) is used to study the electronic excited state lifetimes of the DNA base molecule adenine. Determination of these lifetimes leads to a greater understanding of the photostability of our genetic material under UV radiation. Photoion mass spectra and photoelectron kinetic energy spectra were recorded for an excitation wavelength of 251 nm and an ionization wavelength of 200 nm. Excited state lifetimes were found by varying the pump-probe delay and following any changes in the photoelectron spectrum. Our experimental setup includes a femtosecond (fs) laser system, gas-jet molecular beam source, and photoelectron photoion coincidence (PEPICO) spectrometer. Our initial results identify the states S2($\pi\pi^*$) and S1($n\pi^*$) as participants in the electronic relaxation and determine that the initially excited S2($\pi\pi^*$) state quickly ($\tau 1 = 71 \pm 16$ fs) decays to populate the S1($n\pi^*$) state, followed by a slow decay to S0($\tau 2 = 950 \pm 50$ fs). These results agree generally with previously reported experiments attempting to determine the excited state lifetimes of adenine.

On a Generalization of the Frobenious Problem

Alexander Brown
Dr. Dino Lorenzini, Department of Mathematics, University of Georgia

In this research group and presentation, we consider a generalization of the Frobenius problem, where we seek the computation of the greatest integer having exactly j representations by a collection of positive relatively prime integers. This is a multidimensional generalization of the "stamp problem" in which one finds all achievable postages given two stamps of relatively prime values. It is known that larger than a certain (easily computable) number, all postages are possible. We expected to find and did prove an analogue of a theorem of Brauer and Shockley using the methods of elementary number theory. This theorem that we proved makes it easier to compute examples in dimensions higher than 2, and we show how it can be used for such computation.

Derivation of Neural Progenitors from Induced Pluripotent Stem Cells

Michael Burel – CURO Apprentice
Science as Art
Dr. Steven Stice, Department of Animal & Dairy Science, University of Georgia

Human embryonic stem cells (hESCs) are pluripotent cells capable of becoming all human cell types. More specifically, hESCs have been shown to differentiate into neural progenitors (NPs), multipotent cells able to differentiate into neurons and neuroglia. Due to their more focused potential and viability *in vitro*, NPs are prime candidates for neurodegenerative disease studies and treatment options. However, hESC-derived NPs pose an ethical issue due to initial embryonic destruction and preclude therapeutic and disease study benefits from being realized. Patients may face immune rejection upon hESC-derived NP transplantation, and creating disease-specific cell lines with the genetic and epigenetic characteristics of a neurological disease proves difficult. This study attempts to circumvent these obstacles by differentiating NPs from induced pluripotent stem cells (iPSCs), genetically reprogrammed somatic cells with hESC-like characteristics. To derive NPs from iPSCs, IMR-90 human lung fibroblasts were subjected to lentiviral vectors encoded for transcription factors promoting pluripotency. The reprogrammed fibroblast cells (now iPSCs) were cultured using a three-phase process utilizing different media and dish coatings to direct iPSC to the neural fate and ultimately the NP identity. Initial immunocytochemical results show successful differentiation of NPs from iPSC with the expression of markers previously observed in hESC-derived NPs (Nestin, Musashi-1, and SOX2). iPSC-derived NPs were further differentiated into terminal neurons, where staining suggests the positive expression of Tuj1, a more mature neuronal marker. The NPs will be differentiated into neuroglia, and positive/negative controls against cell lines will be quantified with real-time PCR and flow cytometry. iPSC-derived NPs could fully actualize the clinical potential NPs possess, opening avenues for the reverse-engineering of neurodegenerative diseases like Parkinson's and Alzheimer's while providing feasible treatment options to curtail the symptoms that dominate affected patients' lives.

C. elegans IDE: Gene Annotation and Ability of Protein to Cleave Aβ and a-factor

Mary Burriss
Dr. Walter Schmidt, Department of Biochemistry & Molecular Biology, University of Georgia

Recently, the amyloid beta (Aβ) peptide has been the focus of research involving Alzheimer's disease (AD). Aβ accumulation causes neurodegeneration. The insulin-degrading enzyme (IDE) breaks down insulin, Aβ, and other biologically important peptides. If IDE activity, toward Aβ specifically, could be enhanced, the accumulation of Aβ would occur at a lower rate, delaying the progression of Alzheimer's. The Schmidt lab has identified eight compounds that activate rat IDE *in vitro*. For a cost efficient animal model to study IDE and its activators, we decided to utilize the *C. elegans* system. My aim was to create a *Ce*IDE expression vector and purify the enzyme to assess its ability to cleave relevant substrates and study the effects of the activators. After cloning the gene into the expression vector, the sequencing results showed a 48 basepair deletion in the gene. When comparing my sequence of *Ce*IDE with that predicted by the literature and with that of other species, the 48 basepair gap was present in the same location in all species examined except two orthologs of *Ce*IDE. I hypothesize that the published *Ce*IDE sequence is incorrectly annotated. To test this hypothesis, *Ce*IDE was purified using cobalt-sepharose column chromatography and assayed for activity using fluorescence-based *in vitro* assays. The enzyme cleaved Aβ and a-factor based substrates, so it is reasonable to believe the 48 missing basepairs do not affect the active site of the protein. If the compounds increase *Ce*IDE cleavage of Aβ, they could be used as therapeutic treatment of Alzheimer's disease.

The Abandonment of Truth: Imaging Brad Pitt as a Celebrity Hero
Corbin Busby – CURO Summer Research Fellow
Prof. Isabelle Wallace, Department of Art History, University of Georgia

Fashion photography is now being subjected to the kinds of analysis previously reserved for high art, with increasing but still limited numbers of books and articles published on the subjects of fashion photographers and their work. Emboldened by this trend, my research focuses on the photography of menswear in fashion editorials featuring celebrities. I will focus on editorials that were featured in fashion magazines such as *W* magazine, *GQ*, and *Vogue*. I also will also incorporate the films *Interview with a Vampire*, *Mr. and Mrs. Smith*, and *Fight Club.* The objective of the research is to do a close reading of several interrelated texts drawn from the fields of film, fashion photography, and entertainment news. What binds these texts together in my research is their reliance on Brad Pitt. The connections between these texts will be used for greater understanding of the separation and blending of Pitt's private and public life, and fictional and nonfiction characters and their development of his persona as a product available for consumption in a variety of mediums. Because Pitt is himself a product and because many photographers and filmmakers play with this idea while exploiting his capacity to sell, these texts are well suited to my goal of exploring the role of the celebrity in connection with mass culture and the consumer, as well as the gendering of capitalism and consumerism. Also at issue is the concept of intertextuality, which Vernon Hyde Minor defines as the inability of a work of art to be created in isolation because it has been influenced by earlier and contemporary works of art. When understood as a whole, these interrelated images exemplify and illuminate the phenomenon of *intertextuality,* which is in turn revolutionizing our relation to images and their meaning(s). This research has great implications for how the consumer interacts with the image and perception of self. The results of this research will benefit art historians' interpretations of contemporary art, especially portraiture, and marketers and advertisers who use images of celebrities to sell products.

Evaluation of Physical Activity, Spasms, and Diet After SCI
Elizabeth Callaway & Kirsten Battles
Dr. Kevin McCully, Department of Kinesiology, University of Georgia

People with spinal cord injuries (SCI) are more prone to metabolic and cardiovascular diseases. Contributing factors to these diseases include poor diet and reduced physical activity. The purpose of the study is to evaluate physical activity, diet, spasm activity, and blood glucose levels in a people with complete SCI. After human subjects' approval was obtained, 30 patients will be recruited from the Shepherd Center in Atlanta. Subjects with SCI will complete a food frequency questionnaire, the Physical Activity Recall Assessment for People with Spinal Cord Injury, and the Penn Spasm Frequency Questionnaire to sum up information regarding their diet, physical activity, and frequency of spasticity. Blood glucose levels will be obtained via finger prick to evaluate the risk of developing diabetes. We hypothesize that people with SCI will score lower on diet and physical activity scores than able-bodied people and that high glucose levels will be associated with poor diet, low physical activity, and low spasm activity. If successful, this study will provide a baseline assessment of physical activity, spasm frequency, and diet in people with SCI located in the state of Georgia and the surrounding region. This information will be used to guide future studies designed to improve health in people with spinal cord injuries.

A Georgia High School and Technical College Dual Degree Program
Kathryn Camp – Roosevelt at UGA
Dr. John Schell, Department of Workforce Education, Leadership & Social Foundations, University of Georgia

Georgia is ranked 47th in the nation for high school education due to low test scores and high dropout rates. Currently, Georgia "tracks"

students into either a college preparatory (CP) track or a technical preparatory track in their ninth grade year. The technical track provides courses to develop vocational skills but does not require students to take vital college-bound courses. This setup means that students must make a crucial decision for their future when they are only 14 years old that they cannot change later. In fall 2010, Georgia will eliminate the technical prep diploma to close the education gap. This paper evaluates the impact of this policy and analyzes the potential consequences, including the lack of vocational skill accumulation by students who do not plan to continue their education past high school. As proven through multiple studies by the department of education and independent researchers, this policy risks higher dropout rates and greater unemployment levels for Georgia. To maximize the potential for all students to obtain success, this paper proposes that Georgia create a dual degree program allowing high school students to take traditional high school classes as well as career-oriented courses from a local technical college for graduation. This will lead to lower dropout rates, higher college matriculation, and lower unemployment in the state.

One Heart Flaming More than All the Rest: Considering Biography When Reading the Poetry of Lady Mary Wroth

Julia Carpenter
Dr. Fran Teague, Department of English, University of Georgia

How are readers to take the sonneteer's life into account when analyzing poetry? This paper will consider the possible influence of Lady Mary Wroth's own life events on the sonnet sequence *Pamphilia to Amphilanthus*. Lady Mary Wroth, niece of the famous Sir Philip Sidney, was the first Englishwoman to author a sonnet sequence. The structure and style of *Pamphilia to Amphilanthus* reflect her deep connections to her uncle, Sir Philip Sidney, and to her aunt, Countess of Pembroke. Her scandalous relationship with her cousin, William Herbert, Lord of Pembroke, provides the subject matter. Wroth adheres to Petrarchan form, as seen in her uncle's poetry, and she follows a path blazed by her aunt, also a female poet writing in a time unreceptive to women authors. This paper will further examine why Wroth esteemed her familial ties so strongly. Lady Mary Wroth's poems have only recently been brought to modern light and thus have yet to be dissected ad nauseum. This paper will seek to elucidate further the circumstances that inspired Lady Wroth to write them as well as to investigate the possible bearing of her personal experiences on the meanings of *Pamphilia to Amphilanthus*. In analyzing the style of Wroth's and her uncle's poetry, inquiring into her relationships with the Countess of Pembroke, and immersively studying *Pamphilia to Amphilanthus*, this paper will explore how the unusual events of her life affected her poetic work.

Dispersion of Single-Walled Carbon Nanotubes in Aqueous Solution

Meagan Cauble
Dr. Marcus Lay, Department of Chemistry, University of Georgia

Single-walled carbon nanotubes (SWNTs) show great technological promise in a wide variety of electronic and structural applications. However, investigations and applications of individual SWNTs are severely limited by their insolubility in water caused by their strong inter-SWNT van der Waals attractions. Well-dispersed SWNT suspensions are imperative to the deposition of networks of SWNTs. In order to disperse individual SWNTs in an aqueous solution, surfactants must be used to form micelles around the tubes. In this study, a non-oxidizing purification method was used to remove any remaining bundles of SWNTs, carbonaceous impurities, and catalyst nanoparticles to form suspensions of undamaged, high-aspect ratio SWNTs. Transmission UV-Vis and near-IR spectroscopy were used to obtain extinction coefficients and to produce calibration curves for solutions produced under various conditions. Atomic force microscopy (AFM) was used to evaluate the effect of various suspensions on the average density of SWNTs deposited onto a substrate. This presentation will demonstrate that SWNT dispersion in solution is strongly

dependent upon the concentration of SDS and is not greatly affected by the initial concentration of SWNTs. As the SDS concentration increased, the amount of SWNTs in suspension increased. This was confirmed by AFM images because the density of SWNTs deposited onto substrates increased as the SDS concentration increased. Once the critical micelle concentration for SWNTs had been reached, however, increasing the SDS concentration had little effect on SWNT dispersion.

Characterization and Detection of Non-Covalent Binding of Single-Stranded Oligonucleotides to Single-Walled Carbon Nanotubes

Meagan Cauble
Dr. Marcus Lay, Department of Chemistry, University of Georgia

Studying the ways in which single-walled carbon nanotubes (SWNTs) interact with biological molecules is important as the mechanism of this interaction is poorly understood and is important for their utilization in biological systems. Furthermore, the effect of bound SWNTs on the stability of double stranded DNA has not been thoroughly investigated. In this study, single-stranded DNA (ssDNA) molecules were assembled to the SWNT surface after dialysis with a molecular weight cutoff of 20 kD to remove surfactant molecules used to disperse the nanotubes. Additional dialysis to remove non-bound ssDNA molecules resulted in a solution of ssDNA-SWNTs. The binding of ssDNA to SWNTs was visualized using UV-Vis, nIR, and Raman spectroscopy. nIR absorbance peaks shifted after ssDNA attached to the SWNTs. Furthermore, ssDNA was detected in the solution by UV-Vis spectroscopy, and SWNTs were detected in the solution using UV-Vis and Raman spectroscopy. Atomic Force Microscopy (AFM) was also used to characterize deposited solutions of ssDNA and solutions of SWNTs wrapped with ssDNA. Future experiments will detect the hybridization of complementary DNA strands to the ssDNA-SWNT complexes. Changes in concentration of unhybridized complementary DNA strands will be used to calculate the rate constant of the hybridization reaction. Experiments will be done with various DNA strands to determine if the DNA sequence affects the hybridization kinetics. These results are important because understanding SWNT and ssDNA interactions and hybridization events at the SWNT surface will aid further research for the development of technologies for gene delivery, molecular probes, nano-scale biosensors, and molecular labeling of cells.

Remote Sensing as a Generative Tool in the Creation of Fine Art

Daniel Cellucci
Prof. R. G. Brown, Lamar Dodd School of Art, University of Georgia

Assisting sculpture and studio foundations professor R. G. Brown with his artistic research, I have taken the data previously gathered from such instruments as Ground Penetrating Radar, Electromagnetic Conductivity, and SONAR, and seek now to use these samples to fabricate forms that can truthfully reflect the data from which they are derived. Building upon the results of a research project presented at the 2009 CURO Symposium involving applications of SONAR to underwater art, I will explore new opportunities presented by additional tools employed in the study of remote sensing to the area of sculpture. As defined by the National Aeronautics and Space Administration (NASA), "remote sensing," in the most generally accepted meaning, refers to instrument-based techniques employed in the acquisition and measurement of geographically distributed information. The aims of this research are twofold. The first aim is to create software tools that will convert the data into a format that can be read by machines which can precisely fabricate the necessary dimensions specified by the data. These tools hold value not only for the task at hand but also for future projects that require such translations. The second aim is to experiment with the machines that could be employed to create the sculpture and with the materials used for the sculpture itself. These tools will include, but are not limited to, metal fabrication, CNC router, and Rapid Prototyping devices.

Effect of GIPC-GAIP Coexpression on LPA Induced Signaling in CHO-K1 Cells Stably Expressing the LPA1 Receptor

Ariel Chan
Dr. Shelley Pence, Department of Pharmaceutical & Biomedical Sciences, University of Georgia

Ovarian cancer accounts for more deaths than any other cancer of the female reproductive system in the United States. Lysophosphatidic acid (LPA) serves as a signaling molecule that induces proliferation, metastasis, and migration of ovarian cancer cells through a set of G-protein-coupled receptors (GPCRs) and guanine nucleotide-binding proteins (G-proteins). Regulation of G-protein signaling (RGS) proteins plays a direct role in regulating signaling cascades initiated by GPCRs by accelerating the deactivation of the Gα-subunit of G-proteins. RGS proteins regulate LPA signaling in ovarian cancer cells. The exact process through which RGS proteins bind to Gα-subunits is unknown, however. Previous research suggests that the regulatory process is coordinated by G-proteins and GPCRs. The scaffold protein GIPC has been shown to interact with both RGS19/GAIP and the LPA1 receptor. Thus we hypothesized that GIPC regulates the interaction between LPA1 and RGS19/GAIP proteins. To investigate the relationship between LPA1, RGS19/GAIP, and GIPC, we tested the effect of expression of RGS19/GAIP and/or GIPC on LPA signaling in CHO-K1 cells stably expressing the LPA1 receptor. The ability of LPA to stimulate inhibition of adenylyl cyclase (cAMP) was measured in adenylyl cyclase activation assays. No consistent regulation of LPA stimulated Gαi activity was observed, suggesting that RGS19/GAIP and/or GIPC do not significantly alter activation of this pathway. Future experiments will investigate alternative pathways and additional RGS candidates. Establishing a novel mechanism for LPA signaling has the potential to advance prevention and treatment methods for ovarian cancer.

Factors Affecting Cardiovascular Disease in the Third World

Puja Chebrolu
Dr. Alex Anderson, Department of Foods & Nutrition, University of Georgia

Historically, cardiovascular diseases (CVD) have affected mainly the western world. Evidence suggests, however, that CVD is increasing in developing countries. Growing economies such as Ghana are particularly affected by CVD because of the disability it causes in their working population. Also, countries such as these have to deal with the double burden of infectious disease, which poses yet another challenge to growth. The existing body of published research suggests that hypertension and diabetes are increasing in all areas of Ghana, partly because of the nutrition transition effect. The purpose of this research is to increase scientific knowledge about CVD in rural Ghana. Blood pressure and blood glucose data will be used as indicators for CVD. Statistical analysis will be performed on pre-collected data to identify the factors influencing high blood pressure and high blood glucose among 308 women in rural Ghana. Hypertension will be defined as systolic blood pressure of >140 mmHg, prehypertension as 120-140 mmHg, and normal blood pressure as <120 mmHg. Diabetes will be defined as fasting blood glucose levels greater than 140 mg/dl, and prediabetes as 120-140 mg/dl. The results will be discussed in terms of potential factors such as maternal education, family history, weight, geography, prevention or control of rising prevalence of CVD, and development of methods of early detection of risk for CVD. This study will provide a better understanding of risk factors for CVD in developing countries and aid in implementation of programs and services to lower the burden of chronic diseases.

The Reinstatement of the USIA: Combating the Threat of Anti-Americanism in the Post 9/11 World

Katherine Cherry – Roosevelt at UGA
Dr. Howard Wiarda, Department of International Affairs, University of Georgia

Following the Cold War, the United States emerged as a hegemon lacking a clearly defined enemy. As such, the U.S. lost sight of the critical importance of maintaining a strong public diplomacy front. The abolishment of the United States Information Agency (USIA) symbolizes a shift in American foreign policy. The Clinton Administration created the new position in the State Department, the Undersecretary for Public Diplomacy and Public Affairs, replacing the former Director of the USIA. The new Undersecretary lacks the tie directly to the President formerly held by the Director of the USIA and therefore lacks relevancy and influence in the White House. This has resulted in disjointed, unsupported, and ineffectual public diplomacy efforts. It has also led to an unprecedented rise in anti-Americanism abroad, posing major danger to U.S. national interests, a trend highlighted by the tragic events of 9/11. Over the course of fall 2009, I gathered primary and secondary data on public diplomacy, the USIA, and anti-Americanism with the Center for the Study of the Presidency and Congress. The result of this research is the following conclusion: In order to combat the threat of anti-Americanism, the smart power of public diplomacy must be used. The most effective means to reinvigorate U.S. public diplomacy is to reinstate the USIA. This reinstatement will bring the necessary relevancy and influence back to this crucial part of American foreign policy. The benefits of this policy include increased international understanding and exchange, decreased anti-Americanism, and increased U.S. security.

Delayed Reproduction and Age/Class Structure in a Randomly Varying Environment

Rene Cieszewski
Dr. Daniel Promislow, Department of Genetics, University of Georgia

Various biological populations have been shown to tend towards reproductive behavior that counters common ideas of how such natural populations might act. This reproductive strategy foregoes optimizing short-term reproductive yield in order to maximize long-term reproductive fitness. In particular, these strategies have been extensively studied empirically and theoretically in plant populations. Here we intend to expand existing theoretical models in order to implement more detailed age and class structure in the population. Our model involves a population of seeds with the initial choice of reproducing or remaining as dormant seeds. The idea is that seeds do well when they germinate to become reproductive plants in a good environment but die if they germinate in a bad environment. A stochastic environmental variable determines a frequency of years that are either favorable or deleterious. A seed cannot predict whether it is germinating into a good or poor environment. Seeds that do not germinate have some constant probability of decay and death. Until now, most models have looked at populations where adults only live for one year, like dandelions. In our model, adult plants can delay reproduction and age further, or reproduce and die, though there is some risk that an adult will die without reproducing. We are attempting to derive an analytical solution for the optimal germination fraction using a set of algebraic equations. However, we may be unable to do so and may have to resolve the model with simulation or other numerical evaluations.

The Temporal Distribution of the Vesicular Stomatitis Virus in Experimentally Infected Cattle: An Immunohistochemical Study

Caroline Colden – CURO Scholar
Dr. Corrie Brown, Department of Pathology, University of Georgia

Vesicular stomatitis virus (VSV) is a single-stranded, negative-sense arbovirus in the Family Rhabdoviridae. Cattle, pigs, and horses can become infected. The virus settles in and causes damage to the surface tissues of the feet, tongue, snout, and teats, causing vesicular (blistering) lesions. Infection can have debilitating effects on the animals as they become reluctant to eat, nurse, or move around. They lose a great deal of weight, which diminishes their economic value. To devise effective control measures, it is important to understand how the virus spreads around the body and how it damages cells. In

this study, immunohistochemistry was used to detect the presence of the virus in tissues of cattle experimentally infected with VSV. Virus was inoculated into the skin at the top of the hoof (coronary band), and tissues were examined sequentially to envision presence of virus and associated damage. By immunohistochemistry, VSV was present in the coronary bands and draining lymph nodes 12, 24, 48, 72, 96, and 120 hours post-infection (hpi) with highest intensity in the coronary bands at 48 and 72hpi. Virus appeared predominantly in cells of the stratum spinosum layer, which exhibit unique intercellular bridges. Special staining for these intercellular bridges revealed a marked correlation between presence of this structure and replicating virus, indicating that the intercellular bridges may be functioning in viral entry or transport.

The Effects of Spinal Fusion on the Physical Function of Females with Adolescent Idiopathic Scoliosis

Jaharris Collier – CURO Apprentice
Dr. Kathy Simpson, Department of Kinesiology, University of Georgia

Adolescent Idiopathic Scoliosis (AIS) is a spinal deformity in which the spine curves left and right. The most widely used and accepted surgical procedure for scoliosis is spinal fusion. The exact limitations on physical functions that this procedure causes are currently unspecified. It is our goal to investigate what effect spinal fusion has on physical abilities. Females between the age of 16 and 25 with spinal fusion, with AIS, and with normal spines were compared to determine the effects of fusion on physical function. Radiographs to provide a visual of the spine were obtained from each participant. By using a Vicon machine to capture the movement of reflective markers strategically placed on the participants' body, the range of motion of the spine was determined for various physical tasks. A force platform was used to determine the balance and weight distribution of the participants as they executed certain basic tasks. The data from these test showed significant differences in the functioning of each test group. These differences indicate that performances of daily tasks are noticeably affected by the spinal fusion procedure to a quantifiable amount. By quantifying these differences, a prediction regarding the approximate effects that spinal fusion will have on physical capabilities can be provided to future surgical candidates.

Macular Pigment and Its Relation to Body Fat Distribution

Jessi Crabbe, Madison Asef & Daniel Tim
Dr. Billy Hammond, Department of Psychology, University of Georgia

Lutein and zeaxanthin are two carotenoids found readily in green, leafy vegetables and known to deposit heavily in adipose tissue and in the retina, where they are referred to as macular pigment. Macular pigment has protective benefits against age-related macular degeneration by reducing the amount of oxidative stress in the retina. The level of macular pigment appears to vary among individuals according to percentage body fat. The purpose of this experiment is to evaluate the relation between macular pigment and body fat percentage and to potentially explain sex differences through an analysis of adipose tissue distribution among different body regions. Eighty-six subjects between the ages of 18-40 completed measures of macular pigment optical density (MPOD) and body composition. Heterochromatic flicker photometry was used to determine MPOD, and dual-energy X-ray absorptiometry (DXA) scans assessed percentage body fat. Preliminary data indicate an inverse relationship between body fat percentage and macular pigment ($p < .05$). Evaluating the specific distribution of body fat in both sexes could lead to the discovery of a biomarker for groups at risk for macular degeneration.

Teaching Journalists to Cover Poverty: The Where, Why, and How

Carolyn Crist – CURO Scholar
Prof. John Greenman, Department of Journalism, University of Georgia

"Sense of place" is the way people relate to their environment. This paper aims to help journalists

learn to convey information using local identities to explain poverty in persistently poor locations. Sense of place, historical characteristics, narratives, and tradition should be used to cover poverty in a way that will draw in readers. Community members should be able to form accurate ideas about their locale and know how poverty affects it through crime, health, business, and education. National statistics, surveys, and legislation can be used at a local level to explain poverty trends. This paper provides specific ideas to incorporate poverty coverage in beats across the newsroom. Journalists can include several beats in the coverage, however, and should not hesitate to follow other journalists' examples of coverage. The 21 tip sheets were created for the poverty web site to instruct journalists on how to generate exemplary stories about poverty in relation to financial services, family, race, education, health, housing, and politics. The final section discusses how to market the web site and make it effective and accessible for journalists in the field.

Differentiation of Natural and Post-Vaccinal Canine Distemper Virus Encephalomyelitis

Kelly Cummings – CURO Summer Research Fellow
Dr. Scott Schatzberg, Department of Small Animal Medicine, University of Georgia

Canine distemper virus (CDV) is a highly contagious and infectious disease that affects the respiratory, alimentary, and central nervous systems (CNS) of dogs, with the latter characterized by encephalomyelitis (EM). Since their introduction in the 1960s, modified-live CDV vaccines have been effective in decreasing the incidence of the disease. Rarely, there have been outbreaks of dogs exhibiting CDV EM shortly after vaccination. Differing brain lesion and viral inclusion patterns in such cases served as pathological evidence for post-vaccinal CDV EM, but no definitive molecular proof existed. In this study, genetic differences between the wild-type and the three most common vaccinal strains of CDV were used to determine the origin of disease in previous cases of CDV CNS infection. RNA was extracted from formalin-fixed, paraffin-embedded brain tissue samples from nine dogs with suspected post-vaccinal CDV EM. Reverse transcription polymerase chain reaction (RT-PCR) performed with newly designed primers amplified regions of the phosphoprotein (P) gene identified as having the most genetic variability. DNA sequencing, sequence alignment, and phylogenetic analysis were used to confirm or disprove the presence of vaccinal nucleic acid in each clinical case. Research findings will allow for definitive discrimination between natural and post-vaccinal CDV encephalomyelitis and could aid in improving future vaccine development and disease treatment.

Diminution of Concentrative Nucleoside Transporter 1 (CNT1) Activity in Human Ovarian Cancer Cells: Subtype-Dependent Gemcitabine Response to Exogenously Expressed hCNT1

Shannon Cummins – CURO Scholar
Dr. Rajgopal Govindarajan, Department of Pharmaceutical & Biomedical Sciences, University of Georgia

Ovarian cancer is the fifth leading cause of cancer-related death in women worldwide and has the highest mortality rate of any cancer of the female reproductive system. hCNT1 (human concentrative nucleoside transporter 1) has been indicated as a high-affinity transporter of anticancer drugs (e.g., gemcitabine) in solid tumors, but its efficacy in ovarian cancer is unknown. In this study, we examined the functional expression of hCNT1 in normal and cancerous ovarian cells and compared its contributions toward gemcitabine efficacy in various histological subtypes of ovarian cancer. Immunostaining indicated that, unlike normal ovarian cells (IOSE80), cancerous ovarian cells lack hCNT1 expression at the cell surface. 3H-gemcitabine transport studies also indicate a reduction in transport (3-10 fold) by the ovarian cancer cells compared to IOSE80. Stable retroviral expression of hCNT1 in various ovarian cancer cell lines showed variations in hCNT1 localization, 3H-gemcitabine transport, and drug sensitivities. hCNT1-expressing endometroid cancer cells showed the greatest

change in drug sensitivity tests in which their IC50 values decreased from their wild type around 140 fold, and hCNT1-expressing serous cells also had a moderate decrease of around 25 fold. The teratocarcinoma cells and clear cell carcinoma cells showed no change. The exogenously expressed hCNT1 was not recruited to the cell surface in either of these cell lines. In the clear cell carcinoma cell, it was misdirected to the Golgi. These data indicate that hCNT1 transportability is highly diminished in human ovarian cancers and that reintroduction of hCNT1 to regain gemcitabine sensitivity is subtype specific.

Genetic Diversity of *Yucca filamentosa* and *Y. aloifolia* in Athens-Clarke County, Georgia

Nicholas Dallas, Michael McKain, James Leebens-Mack, & Jeremy Rentsch
Dr. Wendy Zomlefer, Department of Plant Biology, University of Georgia

Yucca is a genus of flowering plants in the agave family (Agavaceae) with approximately 40 species. Gene flow within and among *Yucca* species has been determined to be strongly affected by the particular breeding system. *Yucca filamentosa*, a native species, and *Y. aloifolia,* an exotic species, are both likely pollinated solely by the yucca moth, *Tegeticula yuccasella*. Since gene flow is restricted by the pollinator's limited range, we hypothesize more variation between populations than within populations. Five *Yucca* populations of these two species around Athens-Clarke County, Georgia were sampled to determine genetic variability between and within populations. Total DNA was extracted from frozen leaf tissue. Several plastid (e.g., ycf1) and three nuclear (e.g., ef1a) markers were chosen to capture the greatest amount of diversity among members of the population. These were amplified via PCR and Sanger-Sequencing methods. Sequences are being analyzed for variability, which will be quantified by several statistical methods such as the fixation index. Comparisons of plastid and nuclear DNA data will allow determination of the genetic diversity between populations versus within populations, clarifying conflicting data from previous studies. This study will further the understanding of gene flow between *Yucca* species attributed to yucca moths and provide insight into the possibility of population segmentation.

Calcium Imaging of Nodose Ganglion Cells in Response to Gastrointestinal Signals: CCK and CP 55,940

Kelly Darby
Dr. Gaylen Edwards, Department of Physiology & Pharmacology, University of Georgia

It has been demonstrated that fourth cerebroventricular application of cannabinoid agonist facilitates food intake at lower doses than effective doses injected in the lateral cerebroventricle. It has also been reported that direct injection of cannabinoid agonist into the lateral parabrachial nucleus facilitates food intake. These data indicate hindbrain endocannabinoid systems are important in the control of food intake. More recently, we have found that cannabinoid agonist injected into the fourth ventricle attenuates the elevation of cFos-immunoreactivity in the nucleus of the solitary tract after IP cholecystokinin injection. As an extension of those studies, we will focus on evaluating the activation of primary afferent neurons (nodose ganglion cells) by gastrointestinal hormones such as cholecystokinin (CCK) and the ability of cannabinoid agonists such as CP 55,940 to suppress this activation. Neuronal activation is evaluated by measuring calcium flux into the neuron with calcium-sensitive dyes. We expect to find that CCK will increase calcium flux into nodose ganglion cells and that CP 55,940 will decrease CCK-induced calcium flux. Our findings will be important in developing a better understanding of how neuromodulators like cannabinoids can influence afferent signaling from the gastrointestinal tract.

Constructed Wetlands and Southeast Waste Water Treatment Policy

Shanell Davis – Roosevelt at UGA
Dr. Ronald Carroll, Odum School of Ecology, University of Georgia

This paper reviews existing policies concerning waste water treatment in the southeastern region of the United States. Research has shown that constructed wetlands (CW) are better able, when compared to conventional waste water treatment plants (CWWTP), to degrade pharmaceuticals, hormone disrupting chemicals, and persistent organic chemicals/pollutants that are becoming increasingly harmful to the environment due to bioaccumulation in the ecosystem. This analysis reviews current literature on constructed wetlands and waste water treatment policies in the states of the southeastern region of the U.S. It also identifies the financial, political, and infrastructural challenges associated with implementing constructed wetlands in the Southeast. The paper identifies "best management practices" for CW, such as tolerant vegetation and sediment characteristics, and provides suggestions to augment or change waste water treatment policies to result in cleaner water flowing through the Southeast and how these changes will improve wildlife conservation.

Using the Public Value Mapping Model to Evaluate Groundwater Mining

Shanell Davis – Roosevelt at UGA
Malin Dartnell
Dr. Barry Bozeman, Department of Public Administration & Policy, University of Georgia

Plant Washington, a proposed coal-fired power plant in Sandersville, Georgia, recently received draft permits to withdraw surface and groundwater from the Oconee and Ogeechee River basins. If approved, the plant will withdraw an average of 16.12 million gallons per day (MGD) from fifteen wells in a river basin that has experienced considerable stress over the past decade due to drought. The free and, arguably, excessive use of groundwater by utility companies in the state of Georgia is a perfect context in which to analyze public values using the Public Value Mapping model (PVM) developed by Dr. Barry Bozeman. PVM is a framework used to analyze public values in a context orthogonal to the current economic model by identifying how the market and private sector fail to meet public values, i.e. public values failure. The economic rationale for groundwater usage by utilities will be identified and contrasted with the public values failure. This paper will use the PVM criteria to identify and analyze the public values failures and will recommend viable solutions.

Digital Proliferation: Discerning New Literary Genres Spawned by Digital Technology

Sara Day
Dr. Elizabeth Davis, Department of English, University of Georgia

With the proliferation of digital technology in the past few decades, we have been bombarded by a superabundance of information. As a product of this proliferation, part of a cultural transformation that operates on a paradigm of hypertextuality, literature has changed extensively in form and presentation. While poetic and dramatic modes have evolved with advances in digital technology, the development of narrative, and transformations in narrative theory as a result of hypertext fiction, more generally represent broad innovations in literary genres. Narrative predominantly performs the work of marrying old print traditions with new digital media by revealing the effects of print literature on new electronic forms of fiction, as well as electronic influences on the print novel. As seen in Mark Danielewski's *House of Leaves* and Jonathan Safran Foer's *Extremely Loud and Incredibly Close*, the print novel has become a cross-referential collage woven from an infinite variety of information. Prompted by the call of N. Katherine Hayles in her book *Electronic Literature*, this study responds to the need "to attend to the specificity of networked and programmable media while still drawing on the rich traditions of print literature and criticism." Following the approach of Walter J. Ong, who posited in the 1980s that the novel arose from the development of print technology and, to a greater extent, from the larger transformation of an entire worldview, this study answers the challenge of identifying new literary genres of narrative born from the intersection of print media and digital technology.

Karma in America: The Rebirth of the Male Adolescent Indian Immigrant into the American Hip-Hop Subculture
Katie Deray
Dr. Katalin Medvedev, Department of Family & Consumer Sciences, University of Georgia

When immigrants move to the United States, they often shed their native identity and appropriate a new American one to afford a place in society. The large increase in the Asian Indian-American population has brought about a greater visibility and prominence of the Indian Diaspora. Rather than adopt the mainstream, Anglo-Saxon identity their parents have tried to assume, some male adolescent Indian immigrants (MAIIs) choose the identity of a marginal subculture, specifically the African-American hip-hop subculture, and visually express it through hip-hop dress. In a still racially polarized society, where one is either "white" or "black," this MAII, who is "brown," identifies with African-American subculture. The construction of his new identity is based on his cultural-political-economic context, formed by popular media, and involves the appropriation of the stereotypical black male attitude associated with hip-hop archetypes. From this identification, he derives defiance, aggressive pride, masculinity, and status. His hip-hop dress becomes a proper reflection of his environment—the urban metropolitan scene—and communicates the hypermasculinity he wishes to possess to counteract the emasculation he has experienced as an immigrant and because of his social position as "Other." Based on personal observations, the insights of dress scholarship, and the findings of cultural studies on subcultures, this paper explores how hip-hop dress allows some MAIIs to be socialized into American society and fulfill an immediate social and affective need to belong in a new culture.

Somalia: Recommendations for Conflict Resolution Where Failure is the Norm
Ashley Doliber
Dr. Jaroslav Tir, Department of International Affairs, University of Georgia

Conflict has gripped Somalia for decades with little to no end in sight. While many have tried to resolve the conflict, a sustainable and successful strategy remains elusive. As a failed state with a bitter past and tenuous future, there is a tactical and moral imperative for the region and the global community to bring stability to Somalia. With a moderate government, international attention, and an as-yet imperfect insurgency, there may never be a better opportunity to act than now. Based on analysis of the Somali conflict history and context, as well as research on conflict resolution and management methods, and attention to the consequences of each prescription, this study outlines a comprehensive and multifaceted approach to achieving long-term peace in Somalia. The research indicates taking the conflict of Somalia and the semi-autonomous region of Somaliland on a separate—though mutually informing—basis. For Somaliland, partition is recommended to remove the region from the danger of continued attachment to Somalia proper as well as to encourage nascent state, civil and democratic institutions in Somaliland. In Somalia proper, however, a two-pronged strategy is best. This policy consists of peace- and state-building via coordinated international intervention (e.g., UN, AU, regional actors), followed by negotiations between the government, insurgents, and any other important players (e.g., warlords, clan leaders). Through a careful and considered application of these prescriptions, the country has a chance to usher in an era of stability, security, and opportunity that the people of Somalia have seldom seen.

The Youth of Roswell Voices
Joshua Dunn – CURO Scholar
Dr. William Kretzschmar, Department of Linguistics, University of Georgia

My research is a continuation of the Roswell Voices project, a linguistic and oral history project begun in 2002 by Dr. William Kretzschmar and the Roswell, GA Folk and Heritage Bureau in an attempt to capture the reality of linguistic change in a dynamic environment. While the project originally

focused on the past and the interviewing of older residents, I investigate how the speech—phonetics, syntax, and lexicon—of inhabitants of Roswell ages 18 to 30 groups them together as a distinct community. I also endeavor to characterize how their speech fits into the large picture of dialect research in the American South and whether new patterns and categorizations are pertinent. To accomplish this task, I interview nine informants for one hour each, discussing life in Roswell, and each interview is fully transcribed. For comparison, I also look at interviews of older informants from previous stages of Roswell Voices. I look for common speech phrases and lines of discussion to point to a sense of community. To establish where my younger speakers fall in the spectrum of Southern dialectology, I consult the relevant literature to compile a discrete list of features and then perform a statistical analysis to determine the significant recurrence of these features in the speech of my informants. I also run a computer-based acoustical phonetic analysis to aid in determining the extent to which my informants follow the proposed Southern Vowel Chain Shift.

The Medical Malpractice Crisis: A Proposed Radical Solution

Stephen Earnest – Roosevelt at UGA
Prof. Thomas Eaton, School of Law, University of Georgia

Medical malpractice cases are settled as torts through the civil court system. This method of compensating malpractice victims has been demonstrated to be ineffective, however, by the Harvard Medical Practice Study and two other similar supporting studies. These findings of these studies suggest that only about 1% of all patients injured by malpractice ever file a legal claim. Additionally, they revealed that older adults and low-income individuals were disproportionately less likely to file a claim. The court system is also undesirable from the perspective of most doctors. For both guilty and innocent physicians, trials are usually long, costly, and psychologically damaging, which may lead to lessened ability to provide care. To create a more effective system of compensating victims of malpractice, this paper proposes that the state of Georgia establish a no-fault system of compensation by forming a new government agency to deal exclusively with malpractice disputes. This new agency would standardize payments based on specific types of injuries in a way similar to worker's compensation. This agency would train, authorize, and commission agents to investigate and assess malpractice claims using predetermined criteria and price schedules. Because this process would be far less expensive and time consuming per individual, a far greater number of deserving individuals could be compensated using the same amount of resources. In this way, the no-fault system would provide a fairer means of allocating funds to malpractice victims.

Affordable Housing in Athens-Clarke County: A Two-Pronged Approach

Ellyn Echols – CURO Scholar, Roosevelt at UGA
Dr. Russell James, Department of Housing & Consumer Economics, University of Georgia

Across the United States, state and local governments are becoming increasingly aware of the need to provide affordable housing to their communities. The local government of Athens-Clarke County (ACC), Georgia has been one of many in the Southeast to add to these efforts. Affordable housing is widely defined as housing that costs a family no more than 30 to 35 percent of their annual income, including costs for taxes and utilities. In 2002, a Human and Economic Development study of Athens-Clarke County found that while there exists no real shortage of housing units in Athens, the affordability of these units continues to be a struggle for individuals earning 30 percent or less of the median family income in the area. Furthermore, the type of new development experienced in Athens has been mostly student driven by the large university presence, leading to households clustered together by economic class, and often race, limiting housing mobility and segregating communities. Providing affordable housing will require a comprehensive approach to bettering the lives of Athenians. This paper asserts that in order to provide

affordable housing to the community, zoning ordinances in ACC should be amended. Past zoning ordinances have served to segregate suburban neighborhoods and leave low- to median-income earners without access to affordable homes. By adopting inclusionary zoning (IZ) in Athens-Clarke County (ACC), the local government can promote the availability of housing for lower-income residents and integrate a socio-economically stratified community.

Inclusionary Zoning: Promoting Affordable Housing in the Southeastern United States

Ellyn Echols – CURO Scholar, Roosevelt at UGA
Dr. Andrew Carswell, Department of Housing & Consumer Economics, University of Georgia

Across the United States, state and local governments are becoming increasingly aware of the need to provide affordable housing to their communities. Affordable housing is widely defined as housing that costs a family no more than 30 to 35 percent of their annual income, including costs for taxes and utilities. Historically, the federal government has been the foremost enactor of policy to promote housing for low to mid-income individuals. Recently, however, local governments are utilizing inclusionary zoning (IZ) programs to provide a sustainable source of low-income housing. The local government of Athens-Clarke County (ACC), Georgia has been one of many in the southeast to add to these efforts. In 2002, an HED study of Athens-Clarke County found that while there exists no real shortage of housing units in Athens, the affordability of these units continues to be a struggle for those earning 30 percent or less of the median family income in the area. Furthermore, the type of new development experienced in Athens has been largely student driven, leading to households clustered together by economic class, and often race, limiting their housing mobility. This paper seeks to examine the use of IZ programs across the country and more specifically in the southeast. Combining an examination of the current literature on IZ practices and using ACC as a case study, implications of adopting IZ ordinances are examined. Subsequently, implications for policy makers are discussed.

Civilian-Oriented Preparedness for Radiological Terrorism

Nathaniel Edwards – Roosevelt at UGA
Dr. Dmitriy Nikonov, Center for International Trade & Security, University of Georgia

American security analysts in 2002-2003 predicted an incident involving a dirty bomb (a radiological weapon) within a decade, the most likely form of non-conventional terrorism to occur. The majority of the impact of such an event is psychological. This paper analyzes the harmful effects of trauma from such an event, including psychological and physiological harms, mass fleeing, and an overwhelmed local healthcare infrastructure. Despite predictions of the high level of anticipated psychological trauma after an event, the current policy surrounding radiological attacks focuses mostly on rebuilding and responding to the physical damage. Physical and professional preparedness do not prevent or mediate the psychological impact (the most significant source of disruption and harm) resultant in a radiological attack. This paper proposes that the Department of Homeland Security (DHS) adopt a two-pronged civilian-oriented preparedness program focusing on an education campaign and municipal meetings in high-risk cities. This approach is designed to communicate the risks of radiation and radiological terrorism as well as the best means to respond to an incident. By educating the public and involving them in local preparedness, DHS can develop a culture of resilience among Americans. A resilient community suffers less trauma and, thus, less psychological harm. In turn, a resilient community also suffers less disruption. Less disruption enables the government to provide better care to more victims by avoiding overwhelming local infrastructures and mass fleeing of the contaminated area.

An Examination of Motivation for Medication Adherence in Pediatric Patients with Inflammatory Bowel Disease and Parents

Shan Elahi & Caroline Cates
Dr. Ronald Blount, Department of Psychology, University of Georgia

Inflammatory bowel disease (IBD) is an autoimmune condition of the digestive system affecting approximately 100,000 American adolescents. Symptoms include abdominal pain, nausea, diarrhea, vomiting, and weight loss. These symptoms are treated with several classes of medications. Medication nonadherence places an adolescent with IBD at risk for increased morbidity and mortality. Examining reasons why adolescents and their families are motivated to adhere to IBD medication regimens are vital to improve adherence. The purpose of this study is to explore the relationship between adolescents' and parents' motivation for medication adherence and levels of adherence to prescription and non-prescription medication. Eighty-three adolescents with IBD between the ages of 11 and 18 and their parents completed an interview assessing medication adherence and the Treatment Self Regulation Questionnaire. The TSRQ measures motivation for adherence on three subscales: the autonomous regulatory style (self motivation or a feeling of choice), the controlled regulatory style (motivation due to pressure by others), and amotivation (lack of motivation). Results revealed that responses on the TSRQ for both adolescents and their parents were correlated with adherence to prescription and nonprescription medication. In both adolescents and parents, a positive correlation was found between reports of an autonomous regulatory style and adherence to prescription medications. In parents only, a positive correlation was seen for self-report of an autonomous regulatory style and adherence to non-prescription medication. Results show that higher levels of autonomous motivation are related to improved adherence.

Genomic Profiling of Ovarian Cancer Cells in Response to a Gonadotropin

Joanna Eldridge
Dr. David Puett, Department of Biochemistry & Molecular Biology, University of Georgia

Ovarian cancer is the most lethal gynecological cancer, due to the lack of methods for early diagnosis. High concentrations of the pituitary gonadotropin, luteinizing hormone (LH), and its receptor (LHR) have been found to precede and directly affect reproductive disorders that correlate to high incidences of ovarian cancer. Microarray analysis was used to test the hypothesis that LH may activate certain pathways favorable to tumor progression. This study determined acute effects of LH on the ovarian cancer genome by revealing differentially expressed genes that may result in a specific phenotype. A cell model was developed using human ovarian cancer cells (SKOV3) that do not express LHR (these LHR- cells serve as control), along with stable transformants expressing a known number of LH receptors (LHR+). LH was incubated with LHR+ SKOV3 cells, and following RNA isolation and reverse transcription of the cellular mRNAs, gene expression was measured at time intervals of 1, 2, 4, 8, and 20 hours and compared with ovarian cancer cells receiving no LH. Over 3,000 genes were differentially expressed at least 2-fold upon LH activation of LHR, and 16 pathways previously designated as essential to the survival of ovarian cancer were examined based on the temporal patterns of gene expression. Results indicated major variations in gene expression upon LHR activation, with some of the affected pathways being conducive to growth and others not. Additional studies are required to further delineate the biological meaning of these complex patterns of altered gene expression.

Energy Expenditure and Gain of Nut-Cracking in Wild Capuchin Monkeys (*Cebus libidinosus*) in Piauí, Brazil

Marianne English
Dr. Dorothy Fragaszy, Department of Psychology, University of Georgia

Wild bearded capuchin monkeys use large stones to crack palm nuts. The benefits of nut-cracking are unclear, especially since the activity appears energetically costly and exposes the monkeys to increased risk of predation. We determined whether the energy expended to crack a piaçava nut (*Orbignya*), the toughest nut the monkeys crack, exceeds the caloric value of the nut. From video, we coded nut-cracking behavior in five individuals (2.03 – 4.28 kg) during 50 nut-cracking episodes (striking the nut with the stone). We obtained maximum downward velocity of the 1.42 kg stone to calculate the maximum kinetic energy (work output) produced by the monkeys. Using published estimates of Mechanical Efficiency, ME (% of energy expended that is transferred from precursor to object) for humans, we estimated the monkeys' ME (range = 5% to 35%). Then we used the work output and the ME to estimate energy expended and compared it to the energetic value of an average nut (162 KJ). Our findings suggest that even with a 5% ME, the monkeys gained energetically from nut-cracking. To exceed the caloric value of the nut, the monkeys would have to perform more than 549 strikes on one nut (the maximum we observed in our sample to date was 36). We conclude that nut-cracking is worth the monkeys' efforts, energetically, even if they are intermittently successful at opening a nut. Energy expenditure devoted to search and transport of the nuts (1 – 2 kj/min) is not likely to change this conclusion.

Effects on Blood Flow Velocity and Arterial Diameter Produced by Compression Therapy

Melissa Erickson & Rebecca Parker
Dr. Kevin McCully, Department of Kinesiology, University of Georgia

Cardiovascular disease is the leading cause of death and disability in the United States, but exercise may decrease the risks of developing cardiovascular problems. Risk factors associated with cardiovascular problems are more prevalent in spinal cord injury and multiple sclerosis populations. This study will explore the acute vascular benefits of compression therapy as an exercise alternative. Six able-bodied control subjects completed two rounds of compression therapy—muscle pump (90mmHg @ 5s) and medium pressure (130 mmHg @ 10 s). Ultrasound velocity measurements of the femoral artery were taken during 3 minutes of baseline, 8 minutes of compression, and 2 minutes of recovery. Femoral artery diameter was recorded at baseline and immediately after compression ended. Resting velocities were calculated as average, positive, and negative velocities (10.7, +25.5, -12.3 cm/s, respectively). Velocities during "muscle pump" were 7.7, +30, -17.4 cm/s respectively. Velocities during "medium pressure" were 8.4, +32.3, -21.3 cm/s respectively. "Medium pressure" showed a greater change in positive and negative blood flow compared to baseline. Arterial diameter tended to increase after the "muscle pump" protocol, suggesting flow mediated dilation, a sign of a healthy vascular response. Preliminary evidence suggests that both compression therapy methods produce an augmentation in positive and negative flow but a decrease in net flow. Further testing is needed to determine if either protocol produces a healthy response in vascular dilation. Compression therapy holds promise for producing exercise-related vascular responses for individuals who cannot exercise.

Determination of Interferon Sensitivity of Wild-Type and Lab-Adapted Rabies Viruses

Joe Fang
Dr. Zhen Fu, Department of Pathology, University of Georgia

It has been reported that rabies virus (RABV) can evade the innate immune responses by interfering with interferon (IFN-α/β) responses, particularly the activation of IRFs and with STAT signaling. However, only lab-adapted RABV has been used in such studies. It is not known if wild-type RABV also interferes with IFN-α/β responses. We propose to determine the differences in IFN sensitivity between wild-type and lab-adapted RABV by employing two cell lines and four RABV strains in this study. Mouse neuroblastoma (NA) cells are capable of producing IFN-α/β, while baby hamster kidney cells (BSR) are not. The RABV for this study includes two lab-adapted (B2C and L16) and

two wild-type RABV (DRV and SHBRV). The cells are treated with the same concentration of IFN-α/β and then infected with different RABV. At 24, 48, and 72 hr after infection, the supernatant is harvested for virus titration and cells for assessing viral RNA replication using a spectrophotometer. If a particular virus is sensitive to interferon, a marked decrease should be observed for virus replication and production. The results from this study are important for understanding how RABV develops ways to counteract a host's innate immune responses and may have implications in developing therapy for clinical rabies.

The Perfect Man: Reconstructing the Self Through the Prose and Poetry of Muhammad Iqbal

Rebecca Faulkner
Dr. Max Reinhart, Department of Germanic & Slavic Languages

Muhammad Iqbal develops the ideal of the Perfect Man within the framework of Islamic theology through prose in *Reconstruction of Religious Thought in Islam* and through poetry in *Secrets of the Self*. Iqbal's writing is immensely significant: his thought forms a singular connection between Western philosophical methods and Islamic theology of the East. Iqbal explicates his account of the ideal Self by the philosophical and theological discussion of consciousness, tension, and immortality in *Reconstruction*, which sets the stage for a creative exploration of the same concepts in poetry. Each notion thematically corresponds to a character in *Secrets*; consciousness, tension, and immortality correlate to Saki, Khizr, and Moses, respectively. The concepts map out Iqbal's arguments in *Reconstruction*, and their coinciding personalities accompany his poetic narrative in *Secrets*. Each of the two methods, prose and poetry, illuminates the multiple levels of meaning in Iqbal's account—the different types of analysis necessary to glean meaning from both prose and poetry lend the reader the means to acquire a holistic understanding of Iqbal's work as philosophy, theology, and literature. *Reconstruction* supports the rich poetic palette of *Secrets*, allowing the interactive process of reading poetry to fill the spiritual gaps left by prose that must mesh with an established religious tradition. By examining Iqbal's conception of the Perfect Man, one opens an essential dialogue between East and West that provides opportunity for further scholarship in a largely under-researched field. This dialogue bridges cultures, religions, languages, and locations in an effort to spread understanding.

The Effects of Stress-Induced Analgesia and Peripherally Administered Cannabinoid Receptor Antagonists on Formalin-Induced Pain Behavior

Rebecca Feistritzer – CURO Scholar
Dr. Andrea Hohmann, Department of Psychology, University of Georgia

Stress-induced analgesia occurs when neural systems naturally inhibit pain following exposure to stress in the environment. These pathways release cannabis-like substances in the body called endocannabinoids. Endocannabinoids activate cannabinoid CB1 and CB2 receptors to suppress pain. The present studies evaluated the contribution of peripheral cannabinoid receptors, located outside the brain, in stress-induced analgesia. The formalin test was used to measure stress-induced analgesia in rats. Formalin injected into the rat paw produces pain behavior. It was measured in control rats as well as rats exposed to brief shock applied to the paws. Rats were exposed to footshock to create stress-induced analgesia before injection of varying concentrations of formalin. In both shocked and non-shocked rats, pain behavior increased with increasing formalin concentration. Pain behavior was lower overall in rats subjected to footshock. Thus, stress-induced analgesia suppressed formalin pain. The antagonists AM251 and SR144528 were administered locally in the paw before footshock and formalin administration to block cannabinoid CB1 and CB2 receptors, respectively. SR144528 increased formalin pain, implicating a role for peripheral CB2 receptors in stress-induced analgesia. AM251 produced a trend toward increased pain. Pain behavior of

rats pretreated with either antagonist resembled control rats without stress-induced analgesia. In summary, stress-induced analgesia reduces formalin pain, and blockade of peripheral cannabinoid receptors eliminates pain relief produced by exposure to footshock stress. Our studies suggest that endocannabinoids are released by exposure to footshock stress and activate peripherally located CB2 receptors to produce stress-induced analgesia. Stress-induced analgesia dampens formalin pain through activation of peripheral CB2 receptors.

Patriotism and Protest in Georgia's Civil Rights Movement: The 1971 Columbus Policemen's Strike

JoyEllen Freeman – CURO Apprentice
Dr. Barbara McCaskill, Department of English, University of Georgia

In the late 1960s and early 1970s, as many African Americans grew impatient with the tedious progression towards equality, the Civil Rights Movement became affected by an expression of black nationalism and the antiwar struggle. Influences such as Black Power and the Vietnam War affected the sentiments of many African Americans who still felt denied of equal rights. Using newspapers and court records, I investigated a representative example of the evolving Civil Rights Movement: the summer of racial tension in Columbus, Georgia during 1971. On May 31, 1971, seven African American policemen were arrested for ripping the American flags from their uniforms during a protest. The officers, all Vietnam veterans, claimed that racial discrimination prevailed throughout the police force, and they refused to wear the flag until they received racial justice. Their gesture triggered racial tension and violence, which reached its climax on July 31, 1971, when ninety-one African Americans protested outside of the police headquarters. My research reveals the influence of patriotic sentiments and Black Power ideology on Georgia's Civil Rights Movement. This event demonstrates how one Georgia city served as a microcosm of the heated feelings of impatience and racial power that brewed throughout the United States. Finally, the inclusion of my research in the pedagogical materials of the Civil Rights Digital Library makes knowledge of historical events during this time period accessible to the public through the web.

Charting the Legacy of Southern Womanhood in Southern Gothic Fiction

Charles Ginn – CURO Summer Research Fellow
Dr. Hugh Ruppersburg, Department of English, University of Georgia

The Southern Gothic movement in American literature is characterized by its heightened sense of reality and grotesque characters, who are subjected to the stifling atmosphere of life in the South. The crumbling landscape of the post Civil War era provides the setting for readers to experience many horrifying realities. However, instead of utilizing the Gothic tradition to evoke instances of sheer terror, authors of the Southern Gothic genre use it to explore social issues and the lives of marganialized figures. This research endeavors to analyze the legacy of southern womanhood through a variety of female characters within the genre. Southern antebellum society levied burdensome expectations upon Caucasian women, forcing them to embody the chaste, virtuous ideal of the culture while limiting them to the domestic sphere. Yet Southern Gothic fiction throughout the twentieth century still portrays females who come in conflict with these limitations that originated in the antebellum period. Therefore, this research will chart female representation in relation to the traditional southern ideal of southern womanhood. The implications of race, class, and sexual orientation, in addition to gender, will also be analyzed in order to suggest that oppresive limitations plague a majority of southern female characters within Southern Gothic fiction, regardless of other defining qualities. Futhermore, this research will consult both early twentieth century and contemporary Southern Gothic writers such as Erskine Caldwell, William Faulkner, Eudora Welty, Carson McCullers, Flannery O'Connor, Toni Morrison, Alice Walker, Dorthy Allison, and Harry Crews.

Deterministic Assumptions of Positive Freedom

Matthew Glass
Dr. Daniel Kapust, Department of Political Science, University of Georgia

Conceptions of positive freedom advanced by political philosophers such as Plato, Hegel, and Rousseau hold that free actions are those which conform to what Isaiah Berlin terms one's "true" self. That is, actions are only free when unconstrained by physical barriers and internal barriers such as ignorance and irrational thought. I will be continuing to examine the concept of positive freedom through a study of selected ancient, modern, and contemporary philosophical works, primarily including Plato's *Gorgias*, Rousseau's *On the Social Contract*, and Isaiah Berlin's *Two Concepts of Liberty*. I argue that the conception of positive freedom is self-contradictory and therefore impossible to hold logically. In order for an action to be free under the conception of positive freedom, the action must be perfectly rational. This implies that a perfectly rational action is possible. For this to be the case, the action must have knowable consequences. For actions to have knowable consequences, one must assume a kind of determinism. If any situation lacked causal determinism, then the consequences of the action would be unknowable and a person could not act freely. However, accepting determinism as true is self-defeating because determinism negates the possibility of choice and freedom as existent concepts. Positive freedom, then, assumes a concept which destroys it. It cannot be seen as a logical conception of freedom.

Health Care Around the World

Barrett Gold
Dr. Brenda Cude, Department of Housing & Consumer Economics, University of Georgia

There has been much political discussion in Washington about health care reform in the United States. The reform focuses on three main weaknesses of our current system: inequality in accessing health care, soaring administrative costs, and lack of uniformity. As policymakers try to solve these problems it is important to identify the causes of each problem and explore different solutions. The purpose of this study is to survey the different healthcare systems around the world and identify strengths and weaknesses in each. Ideally, the strengths of foreign systems could be optimally combined with an influx of American innovative ideas to create a sensible proposal for healthcare reform. Through secondary research, this study identifies countries (specifically Japan, Germany, France, Switzerland, and Taiwan) that excel in certain aspects of the administration of health care and identifies certain recurring patterns among the systems ranked most favorably by the World Health Organization. By evaluating the development of health care in the United States and American culture and politics, this study attempts to integrate the successful commonalities that improve efficiency, equality, and costs found in other systems with unique American proposals to create an optimal health care system that would be embraced by the majority of the American public and legislators.

Exploring the Mechanisms of Neuron Specific Glycosylation in Embryonic *Drosophila melanogaster*

Harrison Grace
Dr. Michael Tiemeyer, Department of Biochemistry & Molecular Biology, University of Georgia

Glycoproteins are immensely important molecules that cover the surfaces of cells and mediate many important cell-cell interactions and tissue specific processes. Especially important in neural development, specific glycoproteins direct synaptic plasticity and axonal pathfinding. The mechanisms that regulate tissue-specific glycosylation, however, are relatively unknown. A genetic screen for mutations that affect tissue-specific glycosylation in the embryonic *Drosophila* nervous system identified a novel mutation, designated sugar-free frosting (Sff). The homozygous Sff mutation altered glycan expression and created neural defects in NMJ formation. This led to behavioral defects in

locomotion. To study the connection between altered glycosylation and phenotypic defects and to explore the process of tissue specific glycosylation in neural development, other steps in the Sff-mediated control pathway need to be explored. Toward these ends, a genetic interaction screen was developed and implemented to identify mutations that interact with Sff. The mutagenesis screen was designed to test for non-complementation of the locomotion deficit and the glycosylation defect of Sff mutants. Going through multiple generations, novel behavioral tests and *in situ* antibody staining processed thousands of initial random mutants. Four candidate mutants have been recovered that show significant interaction with the Sff mutation. These mutants will be further characterized and analyzed for their place in the neuron-specific glycosylation pathway by assessing their neural development, glycan expression, and interactions with other genes. Characterizing how these mutations work together will help to elucidate the mechanisms that regulate glycosylation and neural development.

The Mystery of Telomere Recombination in Normal Yeast Cells

Zijing Guo
Dr. Michael McEachern, Department of Genetics, University of Georgia

Telomeres are protective caps at chromosome ends that are composed of direct repeats. These protective caps contribute to aging in humans. Most cells maintain telomeres by using the enzyme telomerase. If cells lack telomerase, however, they can sometimes elongate telomeres by utilizing homologous recombination. Previous research surprisingly has shown that telomeres in wild-type yeast cells can sometimes be recombined. This was shown by their ability to become extended by copying sequence from a transformed telomeric circle. However, it was not possible to tell if the recombined telomeres were normal length or abnormally shortened when they were recombined. Our goal is to construct and use mutationally tagged telomeric circles to distinguish whether telomeres in wild type cells have normal length or shortened length at the moment of recombination. First, DNA circles containing a mutated telomere and a *URA3* gene is constructed. This is done by ligation of a tract of mutationally tagged telomeric repeats into a *URA3* gene-containing plasmid and then excision of the telomeres-*URA3* fragment with restriction enzymes followed by self-ligation into a circle. Next, the circles are transported into *URA3*-deficient *Kluyveromyces lactis* mutant cells, and only the cells with *URA3* genes are able to grow. The telomere structures will then be analyzed to see if wild-type-length telomeres are recombined with the telomeric circles. This study is significant because it could help us see how telomeres elongate using recombination, a process that occurs in a subset of human cancers.

Effects of Daily Saccade Practice on Behavioral Plasticity in Schizophrenia

Erin Hansen – CURO Summer Research Fellow
Dr. Jennifer McDowell, Department of Psychology, University of Georgia

Patients with schizophrenia often have difficulty with behaviors that require executive functioning, such as inhibition. The purpose of this study is to determine if practicing a task that requires inhibition could result in improved performance on other measures of executive control. Over a two-week trial, patients with schizophrenia (n = 30) and healthy control subjects (n = 30) were assigned to daily practice of a saccade task; 15 participants from each group practiced either a prosaccade task (redirection of gaze toward a peripheral cue) or an antisaccade task (inhibition of a gaze toward a peripheral cue and generation of gaze towards the mirror image location of the cue). At the beginning and end of the trial, participants also completed two tests of executive functioning—the Ocular Delayed Response (ODR) task and the Wisconsin Card Sorting Task (WCST). In the preliminary results, every group showed improvement on the practice task. The schizophrenia antisaccade group showed improvement on ODR and WCST, while the schizophrenia prosaccade group showed poorer performance. Although both the schizophrenia and healthy antisaccade practice groups showed

improvement on ODR and WCST, the healthy group showed greater improvement. These results indicate that executive control in schizophrenia may be less malleable than in healthy controls. Also, since the schizophrenia antisaccade group did show improvement on ODR and WCST, the results also suggest that purposeful practicing of executive control tasks could be used as a means of improving generalized executive function in schizophrenia.

Conjugal Transfer of Virulence in the Opportunistic Intracellular Actinomycete *Rhodococcus equi*

Chris Harding
Dr. Mary Hondalus, Department of Infectious Diseases, University of Georgia

Rhodococcus equi is a soil-derived, facultative intracellular, Gram-positive actinomycete that can survive and replicate inside macrophages. It causes severe pyogranulomatous pneumonia in foals and immunocompromised humans. Strains isolated from foals and 30% of those from humans contain an 85-90kb virulence plasmid. Homology searches have shown the plasmid to contain genes with sequence similarly to those involved in conjugative DNA transfer in other organisms. Conjugative ability has been linked to bacterial biofilm formation, which can aid in the pathogenesis of an organism. The conjugative potential of the *R. equi* virulence plasmid has never been studied. This work addresses that deficiency and seeks to establish whether the virulence plasmid is conjugative as is hypothesized. A donor *R. equi* strain containing a marked virulence plasmid was mixed with a virulence plasmid-free recipient strain differentially marked on its chromosome. After incubation, bacteria were subjected to antibiotic selection plating specific for donor, recipient, and transconjugant strains. Putative transconjugants were recovered, and plasmid transfer frequencies were calculated using putative transconjugant/recipient values. Complete virulence plasmid transfer was verified by PCR analysis. Results show the virulence plasmid can be transferred from donor to recipient strains with a frequency ranging from 1 x 10-1 to 1 x 10-2. Plasmid transfer was minimally affected by the presence of DNase, required living cells, and prolonged cell to cell contact, factors consistent with conjugation as the means of transfer. If conjugation and biofilm formation are found to be linked, disruption of the former may prevent the latter and could alter disease transmission.

MicroRNA let-7f regulates STAT1 Activity in Human Lung Epithelial Cells

Craig Hayes – CURO Apprentice
Dr. Ralph Tripp, Department of Infectious Diseases, University of Georgia

MicroRNAs (miRNA) are short ~22nt RNA sequences that govern host gene expression in part by binding to complementary sequences in the 3' UTR of target mRNAs, resulting in their silencing. Hundreds of miRNAs have been discovered or predicted and are believed to target and repress hundreds of targets each. Virus infection of host cells affects miRNA expression, and one such miRNA, termed let-7f, has recently been implicated as important in the response to respiratory syncytial virus (RSV) infection. One function of let-7f appears to be in post-transcriptional regulation of the Signal Transducer and Activator of Transcription (STAT1) gene. In this study, to evaluate the role of let-7f on STAT1 gene regulation, let-7f mimics and inhibitors were co-transfected with Metridia luciferase reporter plasmids controlled by a CMV promoter and containing the STAT1-3′ UTR into human respiratory epithelial cells. The role for let-7f regulation of STAT-1 was determined via luciferase secreted in the cell supernatant, a technique that allows for evaluating the tempo of regulation via luciferase expression without lysing cells. The results showed that the let-7f mimic repressed luciferase expression while the let-7f inhibitor increased luciferase expression compared to mock transfected and non-targeting control transfected cells, confirming that let-7f is a regulator of STAT1 expression. Further studies are ongoing to determine other pathways affected by let-7f during RSV infection.

Gov. James McDowell and the Virginia Slavery Debate of 1831-1832
Mary Boyce Hicks – CURO Scholar
Dr. John Inscoe, Department of History, University of Georgia

James McDowell (1795-1851) was a planter and politician who resided primarily in Rockbridge County in the Blue Ridge Mountains of western Virginia. Because he was from the western part of the state, McDowell was not as involved in the elite social classes found in the state's Tidewater or Piedmont, where slavery was far more prevalent than in the mountains. He was elected to the state House of Delegates (1831-35) and then in 1841 was elected Governor, serving a single term. In 1831, Virginians underwent a major debate over the future of slavery in the state. Triggered by Nat Turner's insurrection, this series of hearings was meant to discuss this evil—slavery. McDowell was a major player in these debates that ultimately accomplished little. He was an excellent orator and delivered two major speeches. My thesis will focus primarily on this debate and McDowell's contribution. Why was so little accomplished? What did Virginians of all classes think of slavery at the time, including McDowell's constituents? How did McDowell's status as a slave-holding westerner affect his opinion on slavery and free blacks? Finally, how did this debate influence the perception of slavery and impact the course of slavery in Virginia up to the Civil War? I have researched in McDowell's correspondence in the Special Collections libraries at University of Virginia and University of North Carolina at Chapel Hill; these along with transcripts and newspaper account of the debates will be the means by which I answer these questions.

Analyzing the Function of O-GlcNAc in the *Drosophila* Nervous System
Marcus Hines – CURO Scholar
Dr. Michael Tiemeyer, Department of Biochemistry & Molecular Biology, University of Georgia

A dynamic cycle of addition and removal of *O*-linked *N*-acetylglucosamine (*O*-GlcNAc) at serine and threonine residues is emerging as a key regulator of intracellular protein activity. Like phosphorylation, the *O*-GlcNAc modification significantly changes the function of the proteins to which it is attached. In addition, the *O*-GlcNAc modification may compete with phosphorylation for certain Ser/Thr target sites. Although there has been considerable research on documenting the functional implications of phosphorylation, the functions for *O*-GlcNAc are just beginning to be understood. A significant amount of cancer and developmental biology research is focused on phosphorylation as a regulator of cell growth and differentiation, but relatively little attention has been paid to the involvement of *O*-GlcNAc in these processes. Like kinases and phosphatases, the enzymes of *O*-GlcNAc addition, *O*-GlcNActransferase (OGT), and removal, *O*-GlcNAcase (OGA), are compartmentalized and regulated. We have capabilities to analyze the presence of O-GlcNAc on the intracellular protein. This project focuses on dissecting cell autonomous and non-autonomous functions of *O*-GlcNAc by altering the expression of OGT and OGA within specific cells of the *Drosophila melanogaster* embryo in an effort to better understand the function of *O*-GlcNAc. Preliminary results have hinted that the addition of more *O*-GlcNAc in the engrailed cells of the *Drosophila* nervous system may hinder the engrailed cells' natural secretion of wingless cells. Further research on the function of *O*-GlcNAc, especially in the *Drosophila melanogaster* embryo, will continue to be conducted to obtain a deeper understanding of the glycan.

The Multimethod Analyses of the Three Separated Parts of a Roman Sarcophagus with the Myth of Marsyas' Musical Contest with Apollo
Shelby Hipol – CURO Apprentice
Dr. Frances Van Keuren, Department of Art History, University of Georgia

The identification of the quarry sources of marbles is important to art historians, geologists, and archaeologists. Two forms of analysis are commonly used: petrographic, the analysis of

the marbles' color and grain sizes, and isotopic, the measure of the marbles' Carbon 13 and Oxygen 18 isotope values. Although this dual method is more accurate than using a single form of analysis, it still often fails to limit the possible provenances to a single quarry. Therefore, Dr. Frances Van Keuren and I propose supplementing the usual two forms of analysis with Electron Paramagnetic Resonance (EPR). EPR is an analysis of the amount of magnesium in marbles' chemical compositions. When used in conjunction with the other two forms of analysis, it adds another element of distinction between the marble varieties. This project examines all the fragments from one of the sarcophagi in Dr. Van Keuren's larger project, Multi-Method Analyses of Twenty Sarcophagi in the Museo Nazionale Romano, Rome. The three fragments all show parts of the Marsyas myth and seem to join. Our EPR data show all the fragments as being of Proconnesian marble. Yet, our isotopic data indicate that the fragments are not of the same variety of Proconnesian marble. Using only isotopic and petrographic analyses would have yielded doubt as to our identification of the marble's quarry source. This study is significant because it shows that, occasionally, two varieties of marble can come together in a quarry and skew analysis results if a block is quarried in such an area.

Trends in Reporting Sustainability Actions
Kema Hodge – CURO Apprentice
Dr. Richard Watson, Department of Management Information Systems, University of Georgia

As consumers become more environmentally conscious, many businesses have begun acting sustainably. Government regulations have also been put in place to compel businesses to report on the decisions that could affect the health of our planet. As a result of societal demands and governmental regulations, the shift toward measuring the sustainability of a product or service, and thus a business, has become more pronounced in recent years. Consequently, many major global companies are willingly and proactively engaged in supporting this important trend of acting sustainably and reporting it. Some companies are reluctant to comply with environmental guidelines, however, and some companies do not report their compliance or non-compliance. This research reports on trends among different information technology sectors. It is based on data available in the annual or sustainability reports from companies in the Technology Hardware, Computers, and Telecommunications sectors. The analysis comes from queries executed in MySQL and will report on different companies' compliance level of environmental guidelines, which section of the global reporting initiative index has the most compliance across the various sectors, which sectors have the highest compliance, and which countries have the highest level of compliance. The release of the findings should encourage more reporting and compliance across the board by corporations, because it will reveal to stakeholders and consumers which businesses are complying with environmental guidelines set by the government. The findings may also shed light on current business efforts to promote sustainability.

A Study of Predictive Modes of Thought with a Focus on Religion, Astrology, and Probability Theory
Dillon Horne – CURO Apprentice, CURO Summer Research Fellow
Dr. Thomas Cerbu, Department of Comparative Literature, University of Georgia

How did predictive modes of thought become a viable tool with which to make predictions? The research begins with the idea of religion as a "first mover" in the explanation of the chain of events that made prediction a justifiable venture. It specifically deals with the concept of "belongingness" as a driving force in this progression of thought. From there, a focus on the 16th century figure of Gerolamo Cardano is placed. He holds special significance due to his early dealings with game theory, giving rise to precursors of modern concepts of probability. His work on astrology provides insight into the development of predictability and why it had such a stranglehold on humanity. Moreover, the esoteric nature of the topic at hand demands a critical analysis into what constitutes "secret"

information. From there follows a brief overview of the correspondence between Fermat and Pascal, but with a larger emphasis on probability as an emergent concept rather than an epochal shift. This leads into modern studies of economics, governmental policy, etc. In particular, what is the connection between predictability and persuasion, and did that relationship lead us into our current recession? This project will build upon other works of history of philosophy and mathematics by providing a more comprehensive focus on predictive modes of thought. In a world so caught up in numbers, the significance of an encompassing study on the development of probability will serve to provide a basis of credibility for acting on predictions.

Generation of a Mutant Core Streptavidin for Complexation with and Crystallization of Biotinylated Membrane Proteins

Steve Hsieh
Dr. Raquel Lieberman, Department of Biochemistry & Molecular Biology, Georgia Institute of Technology

There is a great need to facilitate the crystallization of membrane proteins because once the crystals are grown, the molecular structure can be determined by X-ray crystallography. Membrane proteins prove difficult to isolate and crystallize, however. Hydrophobic membrane proteins have limited hydrophilic interactions to stabilize the protein in its crystalline form, and the lipid membrane surrounding the protein must be replaced with a non-denaturing detergent. The overall goal of this project is to develop a new general procedure to facilitate the crystallization of membrane proteins. For our approach, we take advantage of the high affinity between biotin and streptavidin, a water soluble protein that crystallizes easily. We will crystallize the complex between streptavidin and a biotinylated membrane protein. To achieve this goal, we introduced four key mutations disrupting the streptavidin tetramer to generate a dimeric streptavidin construct with two biotin binding sites. Site directed mutagenesis, which encompassed primer design, PCR, DPN1 digest, transformation, cell culture, plasmid isolation, and sequencing, were used to introduce each mutation. The mutant streptavidin was then expressed and purified. Our next step was to form the streptavidin-biotinylated membrane protein complex. We are testing our method on a biotinylated form of signal peptide peptidase, a membrane protein. The complex was isolated by affinity chromatography. Crystallization trails are currently being conducted. If the approach we are developing is successful and we are able to solve the crystal structure of biotinylated SPP with streptavidin, it will be widely applicable to the structure determination of other membrane proteins.

Investigating a Novel Alternatively Edited Protein's Involvement in Mitochondrial DNA Maintenance

Tiffany Hu – CURO Summer Research Fellow
Dr. Stephen Hajduk, Department of Biochemistry & Molecular Biology, University of Georgia

Trypanosoma brucei is the causative agent of African trypanosomiasis (African sleeping sickness), a parasitic disease that affects humans and non-primate mammals. The parasite belongs to a unique class of protozoa called kinetoplastids, which contain a dense region of mitochondrial DNA named the kinetoplast. To form functional mRNAs, posttranscriptional modification is necessary for most of the kinetoplast-encoded genes found in *trypanosoma brucei*. Recently, alternative editing of the mitochondrial cytochrome oxidase III (COXIII) transcript was found to code for a novel membrane protein, alternatively edited protein 1 (AEP-1). AEP-1 stably associates with the tripartite attachment complex, a kinetoplast-flagellum linkage that is involved in mitochondrial DNA maintenance and segregation. Homology modeling of AEP-1 against the bovine COXIII crystal structure reveals that its N-terminus is positioned toward the mitochondrial matrix. We propose that AEP-1 interacts with the kinetoplast and is involved in its maintenance. In this study, dominant negative mutation was used to investigate the function of AEP-1 in the mitochondria. Cells

with truncated (mt-AEP-1(1-59)-GFP) and non-truncated AEP-1 (mt-GFP) expression were monitored for cell growth abnormalities, and the growth inhibition of mt-AEP-1(1-59)-GFP was stronger than that of mt-GFPs. Fluorescence microscopy revealed that the truncated protein localized to the kinetoplast region, and aberrant kinetoplast morphology or absence of the kinetoplast was observed. To further investigate AEP-1's involvement with the kinetoplast, we will recombinantly express the N-terminal region and perform electrophoretic mobility shift assays to determine its DNA-binding abilities. This study will help us understand the true function of RNA editing in the trypanosome mitochondria.

Effects of Steel and Aluminum Shoes on Forelimb Kinematics in Stock Horses

Elodie Huguet
Dr. Kylee Duberstein, Department of Animal & Dairy Science, University of Georgia

Horseshoes of various materials have been adopted to satisfy the need of performance horses. Steel shoes are common due to their durability, availability, and cost. Due to the importance of performance horses' gaits for competition and athletic purposes, however, lighter weight aluminum shoes have been implemented to accentuate foreleg action. Such shoes are seen to increase speed in horse racing by allowing for more reach and improve the quality of gaits in certain disciplines. By performing a repeated measures crossover study on nine healthy stock-type horses, the effects of these two horseshoe types on forelimb kinematics were analyzed at the trot. Horses were trotted in hand for three repetitions over a distance of 1969.13 meters at day 4, 18, and 32 of each cycle. Video footage was analyzed using gait analysis software (OnTrack EquineTM) for each repetition. Average stride length and velocity remained constant between treatments and times. However, breakover speed increased over time. Knee action showed a trend toward difference between treatment groups, with a larger knee angle observed for horses wearing aluminum shoes as compared to steel. This effect was significant at day thirty-two of each shoeing cycle, indicating that horses may show more treatment effect as they become acclimated to shoe type. This finding is of particular importance to performance horse disciplines for which ameliorated knee action is desirable. A follow-up study is being conducted to further examine the time effect and length of shoeing cycle as it pertains to knee action between shoe types.

Relationships Between Features of Infant Vocalizations and Later Language Development

Sarah Hutcheson – CURO Scholar
Dr. Suneeti Nathani Iyer, Department of Communication Sciences & Special Education, University of Georgia

The purpose of the present study was to examine the development of directedness of vocalizations and canonical babbling in infancy and their possible relationships with later expressive language measures in toddlerhood. The results of this study could potentially help establish a basis for the identification of children at risk for speech and language disorders. As part of an ongoing longitudinal study, 10 typically developing infants were recorded in a laboratory setting from 5 to 30 months at weekly to monthly intervals. The directedness of vocalizations, i.e., whether the vocalizations were undirected or directed toward a person or object, was ascertained at 6 and 9 months using muted video recordings. The age of onset of canonical babbling, or the production of well-formed consonant vowel sequences, was also determined. These results will be compared to scores obtained at 18 and 30 months of age on standardized expressive language and vocabulary size measures. It was expected that vocalizations directed toward a person or object would increase from 6 to 9 months of age as the infants' communication became more intentional. Based on results of previous research, a positive correlation between person-directed vocalizations and expressive language scores and vocabulary size was also expected. However, the prediction was neutral regarding the correlation between earlier canonical babbling onset and those same measures, as

previous research had obtained contradictory results.

The Scaling Relationship Between the Photocatalytic Decay Rate and Height of TiO2 Nanorods
Whitney Ingram – CURO Summer Research Fellow
Dr. Yiping Zhao, Department of Physics & Astronomy, University of Georgia

Titanium dioxide nanostructures (TiO2) are excellent candidates for purification of water and air using UV light energy. In order to optimize TiO2 photodegradation, numerous studies have been carried out to analyze the relationship between nanostructure and TiO2's ability to decay organic material. The quantitative relationship between the decay rate of one particular nanostructure, called nanorods, and their height has not been established. Through this study, we developed a systematic approach to relate the decay rate of TiO2 as a function of nanorod height. A theoretical model was also proposed to explain the experimental data. We systematically deposited nanorod arrays of different length and tested their photocatalytic decay rate of an aqueous solution of methylene blue (MB). The decay rate was measured by plotting the normalized absorbance peak of MB (λ = 664 nm) after regular UV-irradiation time intervals. It was found that the decay rate increased monotonically with nanorod height (h) and fit the power law $\kappa \propto Mh^{\xi}+N$, where M and N are constants, and $\xi = 1.0 \pm 0.5$. A theoretical model was derived that illustrates a direct relationship between the photocatalytic behavior and the morphological structure of TiO2. Both our experimental data and theoretical model fit very well. Our theoretical model also gives a detailed relationship between the photocatalytic decay rate and other experimental parameters such as UV light intensity and illumination area. We believe this quantitative model could be used for other photocatalyst systems with nanostructured morphologies.

Abandon Hope All Ye Who Enter: The Solution to the Cartel Crisis in Mexico
Archil Japaridze
Dr. Sergio Quesada, Department of Latin American & Caribbean Studies, University of Georgia

Amid the myriad conflicts in the world, few seem as hopeless as the drug wars in Mexico. Since President Calderon's declaration of war on the cartels, security in Mexico has rapidly disintegrated. My research attempts to answer the question of how to remove the cartels from power and re-establish the rule of law. The significance of my research lies in the potential to find a solution to this endemic problem. In order to find the keys to defeating the drug cartels, case studies and historical examples will be employed. For my case studies I will use secondary academic sources and primary journalistic sources to examine: the 1920s Bootleggers, the 1980s Colombian cartels, and the modern drug-backed FARC revolutionaries. I believe these cases to be particularly applicable since they showcase the pretenses under which governments have triumphed over extremely strong criminal organizations. Although these studies present valid points, however, Mexico is plagued by unique circumstances, making it imperative to understand the conditions on the ground and apply the relevant methods. Combining Mexico-specific methods and using examples from these case studies, I will formulate a comprehensive drug policy for Mexico to ensure a reasonably peaceful end to the cartel war. I anticipate that the most viable solution to the cartel war is to legalize and heavily regulate drugs, similar to prohibition era alcohol, but with thorough research I will find what offers hope for the fragile state.

How Broad Are Infants' Face Discrimination Abilities in the First Year of Life?
Ryan Jordan & Elizabeth Simpson
Dr Janet Frick, Department Psychology, University of Georgia

At birth, visual perception is broadly tuned, allowing infants to discriminate a wide array of stimuli. Infants who have not yet undergone

perceptual narrowing—whereby visual perception narrows as a function of experience—should have broad face recognition abilities and therefore should recognize faces of humans and non-humans equally well. Infants whose visual perception has already narrowed should easily recognize human faces and show more difficulty in non-human facial recognition. To test this model, facial identity discrimination was measured in 4-6-month-olds ($N = 89$), and 9-11-month-olds ($N = 70$) for the faces of three species: humans (*Homo sapiens*), capuchin monkeys (*Cebus apella*), and sheep (*Ovis aries*). In addition, we measured 4-6-month-olds' (N=10) discrimination of wasp (*Polistes fuscatus*) faces. These species are phylogenetically more distantly related to humans than species previously studied. A visual paired comparison task revealed that 4-6-month-olds discriminated all species' faces equally well ($p > .05$), while 9-11 month-olds were best at discriminating human faces ($p < .05$). These results reflect human infants' transition from being face generalists—broadly discriminating facial identity for numerous species—to being face specialists—becoming experts in discriminating human faces. This research contributes to a better understanding of the perceptual foundations of early social relationships.

Shaped Like Steiner: Biodynamic Farmers of Southern Germany Enacting a Century-Old Tradition of Sustainability

William Jordan – CURO Summer Research Fellow
Dr. Betty Jean Craige, Department of Comparative Literature, University of Georgia

In southern Germany, the concept of a sustainable or self-sufficient farm was introduced and methodized by Rudolf Steiner in a series of lectures he gave in the summer of 1924. This was the beginning of what is known today as biodynamic farming, a tradition still active in southern Germany. While most of Steiner's methods are centered on treating the farm as a self-contained organism, some of his more specific instructions for soil treatment are best described as mystical: they are based on knowledge that Steiner claims to have intuited. My project is an exposition of photography and journalistic writing about four biodynamic farms, all of which have different views on Steiner and implement his agricultural and philosophical guidelines in different ways. I give special attention to closed cycles of resources within these farms. In addition, I discuss how many ideas being presented today by Michael Pollan, an emerging leader in the U.S.'s sustainable agriculture movement, echo or complement those of Steiner.

The Impact of Reading One-on-One to Head Start Children

Meaghan Kelly, Kristina Housworth & Robert Gentry
Dr. Tsu-Ming Chiang, Department of Psychology, Georgia College & State University

Children's reading abilities impact their academic learning and other aspects of life long after the initial stage of basic learning and development. The development of these reading abilities depends heavily on the literacy skills they acquire at an early age. For children to gain these crucial literacy skills, they have to first be exposed to, and gain interests in, books. Past research indicated that 47% of children had no books present in the homes receiving public aid. This sample of disadvantaged children made up a staggering, but not surprising, 35% of children who entered kindergarten unprepared to learn. Reading to children and other environmental conditions have been suggested to contribute to the development of literacy in preschool-aged children. The present study therefore examines the effects of reading on low-income children in terms of their interest in books. It is expected that one-on-one reading would increase the likelihood of children's selecting books as their favorite object. Forty-eight children ranging from 35 to 46 months old, from a larger study, were assessed before a one-on-one reading program began. Individual child's object selections from a toy box, including a small book, along with participating in a play session with12 toys and a book, were recorded as a baseline. Twelve lessons including reading were administered. Two follow-up assessments were

made, eight months and a year, after the program concluded. The results showed that more children selected books as their favorite objects. Detailed results and implications will be shared at the CURO symposium.

Examining the Substrate and Inhibitor Properties of Protease Inhibitors and Statins with OATP Transport Proteins

Fahad Khan – CURO Summer Research Fellow
Dr. Jason Zastre, Department of Pharmaceutical & Biomedical Sciences, University of Georgia

Protease inhibitors (PIs), which belong to Highly Active Antiretroviral Therapy, raise the likelihood of a heart attack by 26 %. The concomitant use of PIs and the cholesterol-lowering agents statins causes muscle toxicity and the disease rhabdomyolysis. The PI atazanavir is purported to be an inhibitor of the transporter OATP2B1, and pravastatin is its suggested substrate. We examined the substrate and inhibitor properties of atazanavir and pravastatin in OATP2B1 and their interaction with the transporter. Human embryonic kidney 293 (HEK293) and Chinese hamster ovary (CHO) cells were transfected to express OATP2B1. Model assessments and substrate/ inhibition studies were performed with transport assays. Estrone-3-Sulfate (E3S), estradiol-17-β-glucuronide (E17βG), and atazanavir solutions were tritium-labeled, and protein assays were performed to measure the final amount of radioactive solution. The OATP2B1 cells featured an average E3S uptake of 0.13 pmol/mg protein, and the control featured an uptake of 0.02 pmol/ mg protein. In the presence of atazanavir, uptake decreased ~ 2.5-fold. Atazanavir uptake was not affected by E3S. Increasing concentrations of pravastatin reduced uptake of E3S. Increasing concentrations of pravastatin did not decrease atazanavir uptake by OATP2B1. Atazanavir reduced E3S uptake, but E3S did not affect atazanavir, so atazanavir is an allosteric inhibitor of OATP2B1. Pravastatin reduced E3S uptake, so pravastatin is a substrate of OATP2B1. Pravastatin did not affect the uptake of atazanavir, so atazanavir is not a substrate of OATP2B1. Atazanavir inhibits OATP2B1 and diminishes the amount of pravastatin that can be taken up by hepatocytes, resulting in high bioavailability and muscle toxicity.

Ground Reaction Forces of Unicompartmental Knee Arthroplasty Patients During Stair Ascent

David Kim
Dr. Kathy Simpson, Department of Kinesiology, University of Georgia

Unicompartmental knee arthroplasty (UKA) is a surgical procedure during which only one side of the knee is replaced. Vertical ground reaction forces (VGRF) are applied to the foot from the ground in a vertical direction and affect knee joint loads and, thus, the length of time an UKA lasts. The purpose of this sub-study was to determine if VGRF were greater for the UKA compared to the non-UKA limb during stair ascent. Twenty-two unilateral UKA participants (age: 66 ± 13.6 yrs; height: 163 ± 7.8 cm; mass: 73 ± 12.3 kg) walked up four steps while stepping on two force-measuring platforms; one mounted in the ground and another in the first step. No significant differences were detected (paired t-tests: $p \geq .082$). Relative to body weight (BW), the maximum VGRF values for the UKA-limb and nonUKA-limb, respectively, were: 1.14 ± 0.09 BW and 1.17 ± 0.09 BW when the foot was on the ground and 1.19 ± 0.15 BW and 1.19 ± 0.13 BW during the first step. Surprisingly, however, more than 50% of the participants had higher VGRF values for their nonUKA-limb compared to their UKA-limb. Hence, many participants may have favored their nonoperated-limb, perhaps by shifting more of their weight to the nonUKA side of their body. Alternatively, these participants may have actively pushed against the ground with more force with their nonUKA limb. Physical therapists potentially should focus on reducing their UKA patients' uneven loading during rehabilitation.

Investigating the Early Developmental Expression of Lysosomal Enzymes in Zebrafish

Maximilian Klein – CURO Scholar, CURO Summer Research Fellow
Dr. Richard Steet, Department of Biochemistry & Molecular Biology, University of Georgia

Proper breakdown of molecules within the lysosomal compartment is necessary to maintain the normal function of cells and their surrounding environment. The importance of this process in human health is stressed by a growing number of genetic diseases that involve defects in the proteins and enzymes responsible for this task. These diseases (termed lysosomal storage disorders or LSDs) have a diverse etiology and are one of the most frequently occurring genetic diseases affecting children in the U.S., with an estimated incidence of 1 in every 5000-7000 live births. Using zebrafish as a model system for developmental studies has many advantages, which include but are not limited to large-scale experiment replication, early developmental genetic manipulation via the use of morpholinos, and microscopic phenotype analysis in the early stages of embryogenesis. Surprisingly, there is little known regarding the early expression of lysosomal enzymes in zebrafish as well as overall yolk biology. To better gauge which lysosomal enzymes are best suited for morpholino-based gene knockdown, developmental expression and regulation of zebrafish lysosomal enzymes were characterized for enzymes that are well understood in human disease. Several enzymes were then selectively targeted for morpholino-based knockdown, and the phenotypic and biochemical effects were analyzed. Additionally, the nature of several of these zebrafish lysosomal enzymes was better characterized by establishing pH activity profiles, yolk deposition, and percent mannose 6-phosphorylation, which yielded some novel findings in zebrafish lysosomal biology. Further developing the zebrafish LSD model will be a groundbreaking step in opening many doors for therapeutic possibilities.

Pediatric Seizures in Larval Zebrafish

Susan Klodnicki – CURO Scholar, CURO Summer Research Fellow
Dr. James Lauderdale, Department of Cellular Biology, University of Georgia

About 55,000 cases of pediatric epilepsy are diagnosed annually. Although there are seizure treatments for adults, there are no known effective treatments for childhood seizures. The reason is not well known and is the cause for our research. Study of neural mechanisms at a young age is necessary to provide knowledge that will allow other researchers to develop more effective drugs for childhood epilepsy. Epileptic episodes are characterized by recurrent unprovoked seizures that result from widespread abnormal brain activity with characteristic discharge patterns. The larval zebrafish is a useful organism that allows us to visualize seizures in a developing vertebrate using confocal imaging. These seizures have a similar pattern to that of children. Zebrafish transgenic for a calcium indicator can be used to monitor neural activity induced by chemoconvulsants. In imaging data, action potentials are sensed as calcium changes, and brain images are collected for further analysis. Using computational algebraic methods, individual seizures and neural pathways are detected, estimated and visualized. Prior to 5 days post fertilization (dpf) waves are characterized by short durations (33 sec/wave). After 5 dpf, cyclical wave patterns emerge, characterized by a series of short duration waves followed by a single long-duration wave (9 min/wave). These results show that the pattern and duration of seizure-induced neural activity change as a function of brain development. This work provides a better understanding of possible mechanisms involved in pediatric seizures that may lead to improved epilepsy treatment.

Effects of Social Institutions on Adolescent Alcohol Use

Rebecca Kopp
Dr. Thomas McNulty, Department of Sociology, University of Georgia

Underage alcohol use is considered a growing social issue. Social scientists often look at the social environment and the institutions of family, school, and religion to understand the onset of adolescent alcohol abuse. By looking at data obtained from Waves I, II, and III of the National Longitudinal Study of Adolescent Health, this research tests the extent to which family, school, and religion affect adolescent alcohol use. For a simplistic test, this research utilizes a multi-regression model focusing specifically on the independent variables: school attachment, time involved in afterschool activities, the amount of religious attendance, and family attachment of an adolescent, while controlling for age, gender, race, economic status, and access to alcohol in the home. To be consistent with other research on the subject, it is expected that adolescents with less time spent with family, at religious services, and participating in extracurricular activities will have higher frequencies of alcohol use and drunkenness in the past 12 months. The results, however, are mixed. Here, there is a significant effect only in family attachment and school activities for adolescent alcohol use. In the model, religion did not have a significant role in predictive adolescent alcohol use. This study aims to use the Add. Health survey to add to the current research on social predictors of adolescent alcohol use. By adding to the current literature, policy makers may be able to develop better programs to aid adolescents. Future research includes coupling this model with qualitative methods to help provide insights into adolescent choices regarding alcohol.

Coagulation Factors Involved in the Pathology of Placental Malaria

Lindel Krige – CURO Scholar
Dr. Julie Moore, Department of Infectious Diseases, University of Georgia

Pregnant women and children are most vulnerable to malarial infection. Malaria in pregnancy leads to intrauterine growth restriction and preterm deliveries, resulting in low-birthweight babies. The underlying mechanisms that lead to these poor birth outcomes are not well understood, but it is known that severe inflammation in the placenta, together with excessive fibrin deposition, are common features of placental malaria and correlate with low birthweight. This inflammation and coagulation process in the placenta occur as an immunological response to the malaria infection. This study addresses the hypothesis that local malaria-induced inflammatory responses induce placental coagulopathy, which is turn leads to significant compromise in placental function and, therefore, fetal distress. This study will focus on the role of coagulation and immunological factors in the disease response process of mice. Murine placental malaria has proven to be an effective model for *P. falciparum* infection in humans. Mouse RNA has been isolated, and primers for each coagulation factor have been developed. Using these primers and isolated RNA, the next step will be to conduct real-time PCR to determine possible upregulation of the coagulation factors. Further research possibilities include determining whether fetal or maternal cells initiate this immunological response leading to inflammation and coagulation in the placenta. Identifying the role of coagulation factors involved in the immunological response to placental malaria will provide further understanding on malarial pathogenesis and ways to prevent fetal growth restriction.

Public Views of Biculturalism

Josephine Kwon
Dr. Victoria Plaut, Department of Psychology, University of Georgia

As America becomes increasingly globalized, concepts such as multiculturalism and biculturalism are important to consider in public policy and social issues. Biculturalism in a psychological light refers to the process by which individuals consider two distinct ethnic cultures as integral to their ethnic identity and behave in a manner that expresses elements from both cultures. Bicultural individuals, generally from minority groups, will comprise an estimated 40% of the population by 2020. As such, considering biculturalism in a public light could illustrate existing attitudes in America.

Estimating the public opinion of biculturalism could indicate the type of social environment within which immigrants and their children live, as well as possible public issues in relation to globalization and biculturalism. To understand the public opinion of biculturalism today, we have composed a questionnaire to comprehensively determine if and what kind of public opinion exists regarding biculturalism. The questionnaire is meant to discern what kind of reaction the term biculturalism produces, how internalized the idea of biculturalism is, and how important biculturalism is perceived to be in America. The responses to this questionnaire could indicate any common attitude towards bicultural individuals in America.

The Old Made New: The Life and Work of Art Rosenbaum

Jared La Croix
Dr. Robert Pratt, Department of History, University of Georgia

I first saw Art Rosenbaum play banjo in the summer of 2009. His talent and enthusiasm impressed me to the point that I began to research who this man is. After conducting numerous personal interviews with Mr. Rosenbaum, I concluded that Art's ability to capture and preserve American folk life distinguishes him as an artist and individual. More than mere historical preservation, however, is Art's ability to transform a folk tradition deeply rooted in the past into a living art form pertinent to the present. While this paper is biographical in the sense that I recorded a chronology of Rosenbaum's life, this paper seeks to push beyond the life of Mr. Rosenbaum himself by examining how, in the words of the artist, "the old is made new." I investigated Rosenbaum's philosophical outlook on art in addition to specific paintings that manifest such viewpoints. What I discovered is a synthesis of a contemporary exposure to a preserved folk culture through mediums of song, painting, and musical recording creates an original experience in its own right. I believe the worth in this project is equally weighted between my own conclusions, such as the synthesis I mention above, and the life of Mr. Rosenbaum himself. In Shakespeare's *The Tempest*, Miranda says, "Your tale, sir, would cure deafness." Mr. Rosenbaum's life story exposes the relationship between who a man or woman *is* and what he or she *creates*, thus alerting his readers and listeners to their own inner passions while simultaneously inspiring external creations.

Renewable Biomass and Georgia: A Legislative Update

Jonathan Lee – Roosevelt at UGA
Dr. Robert Izlar, Center for Forest Business, University of Georgia

The Energy Independence and Security Act of 2007 (EISA) reduces Georgia's ability to economically manufacture renewable liquid fuel from forest biomass. Georgia ranks first in the nation in its endowment of recoverable forest biomass and third in total available biomass. While Georgia possesses 24.7 million acres of recoverable forest biomass, however, the EISA definition qualifies only 7.5 million acres as a source for "renewable biomass" feedstock. The purpose of this presentation is to explain new legislation passed or pending in Congress on this issue since 2007. The purpose of this research is to suggest and support a definition that would better enable Georgia to establish a viable renewable fuels industry. This definition should be a broader, more scientific definition that includes any organic material available on a renewable, recurring basis. This definition would likely incorporate appropriate federal lands and all private forestland in compliance with current Georgia Best Management Practices for timber harvest. Naturally regenerated hardwoods and plantation-grown pines would likely be included regardless of when they were last harvested. With this broad renewable biomass definition, nearly 24 million forested acres of Georgia's 34 million acre total land base would qualify for use in the production of transportation fuel under EISA. Research is based on literature, including congressional testimony, trade association position statements, personal interviews, and newspaper articles. Forest inventory reports and scientific journals are included when appropriate. The research intends to show that

current law will not have the long-term effect of stabilizing the size of Georgia's forest cover and may, in fact, decrease Georgia's forested estate due to the suppression of consumptive forest markets. Furthermore, the definition as passed jeopardizes the establishment of a renewable fuels industry in the state, and, finally, that its language is based on a precautionary, yet misguided, philosophy of environmental protection.

Complementation of Chromosomal Deletions in Mycobacteria

Natasha Lee – CURO Scholar
Dr. Russ Karls, Department of Infectious Diseases, University of Georgia

Tuberculosis (TB) is an infectious disease caused by *Mycobacterium tuberculosis* (*Mtb*). The World Health Organization estimates that one third of the human population is latently infected with *Mtb*. Those infected carry a 10% risk of developing TB. Understanding how this pathogen survives within a host will aid in efforts to prevent, diagnose, and treat TB. Defining the relationship between different *Mtb* genes and virulence is typically achieved by characterizing mutants with altered target genes. To ensure that the resulting phenotype is associated with the mutated gene, the wild type phenotype must be complemented (restored by reintroducing the wild type gene). This can be performed by PCR amplification of the gene and cloning the gene onto a plasmid that can replicate in *Mtb*. The focus of my research is to complement a 16-kb deleted region of the *Mtb* genome. This region is thought to attribute to virulence. Plasmids containing portions of the region have been created and will help define the functions of the encoded genes. Reconstruction of a plasmid with the entire 16-kb region has been problematic, however, leading us to pursue a strategy to recover this region by homologous recombination. Efforts are in progress to generate a system to screen for plasmids in which the targeted region has been recombined onto them. This work is anticipated to allow the generation of complementation plasmids that have a low risk of PCR-induced mutations. This system will aid TB vaccine research and facilitate studies identifying which *Mtb* genes encode virulence factors.

Rce1p Transmembrane Topology

Edward Lilla
Dr. Walter Schmidt, Department of Biochemistry & Molecular Biology, University of Georgia

Uncontrolled proliferation and migration of transformed cells in the human body are two of the main characteristics of cancer. The Ras signaling pathway, which is essential for growth in normal human cells, is hyperactive in cancer. The oncoprotein Ras has been identified as a possible therapeutic target for treating cancer. Rce1p is a protease responsible for post-translation modification of Ras. By inactivating Rce1p, Ras will not be able to initiate cell propagation in cancerous cells. To manipulate the activity of Rce1p, a better understanding of the mode of cleavage and topology of the protease must be gained. Western blotting and PEG-mal (methoxypolyetheylene glycol 5000-maleimide) modification of cysteines found in Rce1p will help determine the topology of Rce1p. Several yeast mating test has been performed on yeast strains carrying various mutants of Rce1p. These mutants containing point mutations were in cysteines that were modified to alanines or serines. The mating tests have verified that the yeast strains successfully express the desired mutant strains of Rce1p. Next step of our project is to perform PEG-mal reactions on the mutant strains of yeast. Once the PEG-mal reactions are complete, Western blots can be performed on the samples. The results from the Westerns will help us determine if cysteine modification of Rce1p occurred. The combined results from these several mutants will help determine if our current topology map is correct or needs modifications.

Harboring an Ancient Killer: Restructuring Malaria Control in Nigeria

Ammarah Mahmud – Roosevelt at UGA
Dr. Christopher Whalen, Department of Epidemiology, University of Georgia

With 90 percent of malaria cases occurring in Africa, malaria continues to be a fatal concern in developing countries. Nigeria accounts for one-fourth of incidents in the World Health Organization's Africa Region with severe effects on the nation's socio-economic infrastructure. Nigeria receives a yearly allotment from global aid groups and spends over $85,000,000 on malaria control. Funding is poorly allocated, however, and the process lacks transparency. Only one-fourth of funding is directed toward the most necessary precautions against malaria. In similarly situated nations, cross-analysis reveals a correlation between a nation's financial assistance and effective control of malaria. This paper proposes that Nigeria restructure its funding system and allocate money to the most effective methods of disease control with consideration to Nigeria's particular economy and geography. Prevention methods should be simplified and taught to the population, with specific allotment to community clinics catering to rural populations. To assure transparency, this proposal envisions an oversight role for international organizations that contribute money to Nigeria's prevention campaign. Aid groups should stress that, in a mobile society, malaria in any part of the world is a threat to the international community. Thus, financial contributors have a right to oversee the maximum utility of supplies and distribution in areas still plagued with the disease. Health-focused groups should collaborate with other aid organizations currently engaged with Nigeria's government. Economic initiatives should incorporate requirements that Nigeria restructure its disease prevention program with greater transparency as part of an overarching development scheme.

The U.S. and the ICC: How the United States Has Behaved Toward the Court and How It Should Behave in the Future

Bridget Mailley – CURO Summer Research Fellow
Dr. Amy Ross, Department of Geography, University of Georgia

The International Criminal Court (ICC) is the first permanent, international court that prosecutes individuals for their actions during human rights atrocities. The U.S. and the ICC have claimed to have the same goals concerning justice. Throughout the U.S.'s ongoing relationship with the ICC, however, it has wavered from hostile, to acquiescent, to potentially an ally. According to my data, two of the main problems the U.S. has had with the ICC concern the breadth of the ICC's jurisdiction, and ICC's potential power to stall strategic American activities abroad. Although many steps were taken to impede the effects of the ICC on American power, including American Servicemembers' Protection Act, most of these steps have been rendered impotent since 2008. As of July 2009, statements from my interviews indicated that the Obama Administration was undergoing a policy review to understand what position the U.S. would take on the ICC in the future. Recent statements by Secretary of State Hillary Clinton and Ambassador to the UN Susan Rice have indicated friendly and more cooperative intentions from the U.S. One interviewee in particular, council to a Congressman dealing with the ICC issues, thought that even though the ICC is not currently a pressing issue for the government, the U.S. should become a collaborating party in order to protect American interests concerning the Court. My data suggest that the U.S. should adopt a more cooperative approach to the Court in order to rectify differences and ensure that the ICC can be a space for justice.

Separate but Not Equal: An Analysis of Segregation and Inequality in Georgia Public Schools

David Malison – CURO Scholar
Dr. David Mustard, Department of Economics, University of Georgia

It has been more than fifty years since the Supreme Court delivered the landmark *Brown v. Board of Education* opinion, banning compulsory segregation in schools across America. Although overt racial discrimination remains prohibited by law, schools today find themselves increasingly divided across racial lines. This trend has left many low-income, minority students concentrated in urban schools

while more affluent, white students receive their education in suburban neighborhoods. How have these trends influenced the black-white performance gap on standardized tests in Georgia? Using data collected by the Georgia Department of Education, our study aims to answer this important question. We have recently assembled a database that contains detailed information on every Georgia public middle school over the past five school years. We plan to analyze these data first with cross-sectional ordinary least squares regressions, and then by using a linear fixed effects model. Our primary measure of school performance will be the percentage of students meeting statewide standards on the Criterion-Referenced Competency Test (CRCT). We expect to find that increasing segregation has caused the black-white achievement gap to expand, consistent with other recent findings in this area. In today's economy, the impact that schooling has on future earnings cannot be overemphasized. A growing gap in educational achievement will ultimately lead to increased inequality across racial lines. By calling attention to these problems, we hope to encourage the Georgia public school system to explore and adopt policies that mitigate the negative consequences that segregation may have on students today.

Water Droplet Generation in Ferrofluid-Based Magnetorheological Fluid

Francisco Marrero – CURO Apprentice, CURO Summer Research Fellow
Dr. Leidong Mao, Department of Engineering, University of Georgia

Droplet generation is an important branch of microfluidics where micro- to femto-liter droplets are formed at the intersection of two immiscible liquids. Researchers have found various applications for these droplets in biology, chemistry, and pharmacy, where discrete and precise reaction chambers were generated at a high throughput. In a typical flow-focusing droplet generation device, the size of droplets is controlled by adjusting the flow rate ratio of continuous (usually oil) and discrete (usually water) phases. Droplet size is inversely proportional to flow rate ratio between continuous and discrete phases, while droplet velocity is proportional to the flow rate of the discrete phase. Independent control of the droplet size and its velocity is important for droplet-based microfluidic analytical applications. In this paper, we have developed a novel method that uses external magnetic fields to adjust the viscosity of the continuous phase and therefore control the size of the generated droplets. We use a magnetorheological fluid and ferrofluid mixture as the continuous phase. Both contain suspended micro- and nano-sized magnetic particles, which under an external magnetic field induce chain-like aggregates inside the mixture that effectively increase the fluid viscosity. Preliminary results show that the water droplet size can be controlled by changing the amplitude of the field. Moreover, this scheme enables us to manipulate and position individual droplets as desired. In summary, we have a developed a device that precisely controls droplet size and organization without affecting other variables. Applications include shortening prototyping phase, DNA amplification, study of crystal growth, and nanoparticle synthesis.

Increasing Personal Finance Education in Athens-Clarke County High Schools

Kathryn McCabe – Roosevelt at UGA
Prof. Michael Rupured, Department of Housing & Consumer Economics, University of Georgia

Despite growing support for personal finance education and its lasting benefits, American high school students continue to show a lack of financial literacy. On a 2008 survey distributed by the Jump Start Coalition polled the literacy of over 5,000 high school students in financial matters, students scored an average of 48.3 percent correct. Furthermore, the National Bureau of Economic Research estimated that as much as one-third of credit fees are related to a lack of financial knowledge. These statistics and other financial research surveys suggest that students are leaving high school without adequate knowledge of financial matters, making them susceptible to poor financial decision making in the future. This paper is a commentary that pieces together statistical information from different research-based

sources on environmental education and financial knowledge to make a policy recommendation for financial education reform in Athens-Clarke County. The policy proposes that the Athens-Clarke County School Board implement a standardized and mandatory personal finance program for its school system that would incorporate specific financial curriculum into a 6- to 8-week time frame, separate from economics subjects. A task force consisting of teachers and administrators would be responsible for assembling in-depth, practical curricula from existing comprehensive financial programs. They would also create a process for teacher certification to ensure teacher expertise in financial subjects. If undertaken, this policy would benefit Athens' students, both advantaged and disadvantaged, by providing them with knowledge that will help them become more informed financial decision makers.

The Elemental Problem in Grand Strategy: A Principle Model of Analysis

Bethany McCain & Christopher Looft
Dr. Brock Tessman, Department of International Affairs, University of Georgia

Grand strategy can be defined as a state's plan for the long-term connection of all available means toward the achievement of its fundamental goals. Past attempts at defining grand strategy rely too heavily upon the enunciation of hard power objectives as both a means for reaching goals and as the goals themselves. Our paper seeks to define grand strategy in a new, holistic, analytical model that recognizes the interrelated nature of the multitude of goals of any actor. This model is unique in its comprehensiveness and flexibility; it is not limited by perspective or time for analysis. This core model can therefore be applied to any actor at any time in history. Our tiered model rests upon the five principles of hard power, soft power, resource security, humanitarian leadership, and multilateralism, which together form the basic analytical lens for interpreting any event of grand strategic importance. From this analytical foundation stems the elemental layer, which consists of defense, diplomacy, resources and economics, and ideology. These layers form the organizational basis for our paper and is essentially universal as interpretational mechanisms: they are flexible enough to interpret grand strategy from any perspective, be it modern Chinese goals or those of ancient Athens and Sparta.

The Effect of Political and Economic Shifts on Private Charitable Giving

Connor McCarthy & Robert Thrasher
Dr. David Mustard, Department of Economics, University of Georgia

This paper will measure the effects of government economic policy on private charitable giving. We have three interrelated motivations for this study. First, we are personally convinced of the vast importance of private philanthropic giving to spur social progress in the United States. Second, we theorize that private philanthropic giving, much like private capitalist markets, tends to be more efficient than public funding. Third, given the current recession and the current administration's high level of spending, this study is relevant and timely. We use data from the Panel Study on Income Dynamics (PSID), a longitudinal survey begun in 1968 that tracks a representative sample of 7,400 U.S. households' economic, health, and social behavior, and from the Center on Philanthropy Panel Study, a component added to the PSID in 2001 to track philanthropic giving. Using the PSID, we control for household fixed effects, head of household and family demographics, and public and private financial status. We also include political, macroeconomic, and natural shocks as explanatory variables. In some cases, these are represented as dummy variables whereas others are numeric figures normalized to a base year. We complete the model using charitable giving and volunteering levels as the dependent variables regressed against these determinants. Our analysis includes discussion of the regression results as they differ between observed years and across sample groups. The purpose of this study is to determine the relationship between political and economic shifts and charitable giving. If a definitive

relationship is established, further research can assist in effective policymaking.

Serum Vitamin D and Bone Structural Development in Young Adult Females: A Three-Year Prospective Study
Leslie McConnell
Dr. Richard Lewis, Department of Foods & Nutrition, University of Georgia

Previous research has demonstrated the importance of vitamin D in bone health, but longitudinal studies in this area, especially in young adult populations, are lacking. The purpose of this study was to compare changes in vitamin D concentrations and bone strength of the tibia and radius in females (n = 69 at baseline age 18.2 ± 0.4; n = 66 at 3-year follow-up, age 21.3 ± 0.4). Lean mass, fat mass, and percent fat were measured using dual energy X-ray absorptiometry (DXA). Peripheral quantitative computed tomography (pQCT) assessed bone and muscle parameters at three different sites on the radius and tibia. Serum vitamin D [25(OH)D] levels in the blood were measured using a DiaSorin radioimmunoassay, and concentrations ranged from 45-150nmol/L at baseline and 48-168nmol/L at follow-up. Hypovitaminosis D ([25(OH)D] < 80nmol/L) was present in 35% and 30% of participants at baseline and follow-up, respectively. Paired samples *t*-tests demonstrated a significant increase ($p = 0.004$) in 25(OH)D concentrations over time. Pearson and partial correlations (controlling for baseline height) revealed significant positive associations ($p < 0.05$) between percent change 25(OH)D and percent change total cross-sectional area (CSA) at the tibia, but an inverse relationship ($p = 0.003$) between percent change 25(OH)D and percent change cortical thickness at the tibia. Increasing levels of circulating vitamin D may be beneficial with respect to tibial size in young adults, as demonstrated by changes in CSA, but future supplementation trials may elucidate the role of 25(OH)D in bone strength indices more definitively.

The Success of Recent U.S. Foreign Policy in Latin America
Sharon McCoy – CURO Scholar
Dr. Loch Johnson, Department of International Affairs, University of Georgia

In 1973, the United States engaged its intelligence and economic resources in the overthrow of the democratically elected, socialist government of Chile. A manifestation of U.S. foreign policy throughout the Cold War, these actions adhered to the prevention and eradication of communist and socialist governments worldwide. Since the close of the Cold War, a different U.S. strategy has emerged: advocating the spread of U.S. economic principles and interests over political ones. This paper examines past and present U.S. foreign policies toward Latin America to evaluate the viability of the policies and their implications for future U.S.-Latin American relations. Currently, data have been collected from government, academic, and journalistic sources regarding former U.S. actions in Chile with further information being compiled on recent U.S. policy decisions in Venezuela. A comparison of these two data sets will focus on the specific methods of U.S. action in each country; the factors influencing U.S. decisions at the time; and the subsequent societal, governmental, and international effects of the policies. The expectation is that both foreign strategies—that of the Cold War era and its successor—have failed to yield sustainable improvements in U.S.-Latin American relations and have neglected to thoroughly consider the ramifications for Latin American countries. The ultimate intention of this paper is to put forth suggestions for enhancing U.S. relationships with its southern neighbors based upon analysis of the successes and failures of the past and current U.S. foreign policies in the region.

A New Definition of Treason: The 1794 Treason Trials
Laura McDonald
Dr. Kirk Willis, Department of History, University of Georgia

This paper examines the 1794 Treason Trials as a turning point in the British definition of treason and how this turning point sheds light on the transfer of state power from the king to the people. Without a written constitution, British state power relied on a carefully balanced relationship between the king, Parliament, and the people. The definition of treason, however, identified state power as residing solely in the person of the king; threats to the people or to Parliament were not considered attacks on the state. When the spread of radical ideology from the French Revolution made such attacks seem imminent, Prime Minister William Pitt and his attorney-general John Scott brought the reform leaders to trial for treason. Ultimately, the defense, led by Thomas Erskine, was able to prove that the defendants' attempts to reform Parliament in no way represented an attack on the person of the king and therefore did not qualify as treason. The acquittal of the defendants led to new legislation that redefined treason to include attacks or threats to Parliament, acknowledging that state power had shifted beyond the king. The research for this paper relies on a close reading of the transcripts of the treason trials, personal accounts from the defendants and the lawyers, and secondary source material. The paper seeks to demonstrate that the trials marked not only a shift to a new definition of treason but also a recognition of a new definition of the power and rights of the state.

PAX6 Mutation Screen
Margaret McDougal – CURO Scholar
Dr. James Lauderdale, Department of Cellular Biology, University of Georgia

Aniridia is a rare congenital eye disorder characterized by partial or complete lack of iris. Additional defects include foveal hypoplasia, indicated by early infancy nystagmus, cataracts, corneal clouding, and glaucoma. The progressive nature of the disease leads to reduced visual acuity and blindness. Two-thirds of aniridic patients have heterozygous mutations in the *PAX6* gene. The PAX6 protein is a highly conserved transcription factor crucial for normal eye development and cornea homeostasis. The protein's exact molecular mechanism is still uncertain, however. Understanding the phenotypic variation caused by different *PAX6* mutations helps explain the molecular mechanism of the mutated protein and the complex role of PAX6 in the eye. In this project, we screened the *PAX6* gene of 153 individuals, representing 56 aniridic families, by direct gene sequencing and conducted detailed ophthalmologic evaluations for each aniridic patient. A total of 37 mutations were identified, including 19 novel mutations. I compiled our results with the Human *PAX6* Allelic Variant Database to create a total of 547 independently ascertained variants in *PAX6*. Of these variants, 534 are associated with ocular malformations, and 444 are specifically causal for isolated aniridia. Further analysis of mutation type frequencies, distributions, and hotspots indicate that nonsense (39%), frame-shift (29%), and splice junction (19%) mutations are predominately associated with aniridia, whereas the majority of non-aniridia phenotypes are caused by missense mutations (75%). This compiled mutation spectrum continues to yield important insight into the molecular mechanism of the mutated protein and the likely phenotypic defects.

The Skeleton Keyhole
Richard McKelvey
Prof. Andrew Zawacki, Department of English, University of Georgia

Problems arise in compromising the inherent and necessary difficulties of certain complex, opaque poetries in efforts to make such poetry more accessible to readers. The poetry, which I will term "contemporary American experimental poetry," hardly fits under a single umbrella of categorization but shares in common an unavoidable inaccessibility. Refusing populist compromises, I believe such poetry could, however, be more engaging to more readers through collaborations with other artistic media, including music. I intend to use experimental poetry represented primarily by the work of Susan Howe, Rosemary Waldrop, and Nathaniel Mackey, as a starting point. From there, I hope to marry the inevitable difficulty of this poetry

with my own populist ideals through musical collaboration. Similar collaborations in the past have sought to push the poetry itself outward. Such collaborators include Steve Swallow with Robert Creeley, Nathaniel Mackey in numerous instances, Philip Glass with Allen Ginsberg, and David Grubbs with Susan Howe. I diverge from this foundation primarily through the intent of my collaborations. I am not a jazz musician and have no qualms with setting my demanding style of poetry to pop music to expand readership. This does not mean the music cannot interact critically with the poetry, but simply that the primary purpose of the music is to increase accessibility. The final product will consist of roughly 20 pages of poetry, a critical introduction, and a full album of the entire collection set to music through collaborations with local musicians, myself included.

Children's Attachment Security and Mothers' Separation Anxiety

Amanda McKenley – CURO Apprentice
Dr. Hui-Chin Hsu, Department Child & Family Development, University of Georgia

The social environment in which a child is raised can greatly affect the quality of his or her attachment relationship, an enduring emotional bond with parents. The mother's emotional wellness, be it positive or negative, is an important aspect of a child's social environment. When mothers are unable to protect their children, they experience separation anxiety, which is an unpleasant state of guilt, worry, and sadness. The purpose of this study is to investigate whether a mother's separation anxiety is associated with a child's attachment security. It is expected that mothers' greater separation anxiety is correlated with lower quality in child attachment security. Using video data from a larger longitudinal research, 30 four-year-olds were observed interacting with their mothers and strangers and playing by themselves for more than two hours in a laboratory playroom. The quality of children's attachment security to their mothers was determined using the Q-sort method, which has 90-item descriptive statements of the style of child's behavior. An example of such a descriptor would be "Child cries when mother leaves him/her with a babysitter." The rater sorted items into nine categories according to their relevance to the behavior of the child being assessed. Attachment security scores were obtained by correlating raw scores from the Q-sort with the standardized criterion scores. Also, levels of separation anxiety in the mothers were obtained when mothers filled out the Separation Anxiety Scale twice, at the time of the observation session as well as at a lab visit four years prior.

Repression, Literature, and the Growth and Metamorphosis of Czech National Identity in the 20th Century

Ilana McQuinn
Dr. John Morrow, Department of History, University of Georgia

Czechoslovakia in the 20th century followed a tumultuous path that led it to freedom from the three-hundred-year yoke of the Habsburg Empire, an existence as a small democratic nation surrounded by dictatorship, Nazi occupation twenty short years later, and finally total and complete de-individualization under Soviet communism. The Czechs were pushed to independence by frustration with a protracted existence as the "other," or the marginalized minority nation not in power, in the German-dominated Habsburg Empire. A large component of the formation of Czech identity depended on linguistic differences and the contrast with the German, and as such struggled to develop an identity independent of the crutch of the "other." Some have argued that the muted method of resistance that the Czechs employed through the majority of the Nazi and Communist control of Czechoslovakia weakened the Czech claim to a unified identity as a people. The ironic comedies of Jaroslav Hašek and Bohumil Hrabal, however, exemplify how crucial intellectual and literary figures became for solidifying the Czech national identity. This paper examines the manner in which Czech culture and national identity developed in the 20th century with special attention to *The Good Soldier Švejk*, *Closely Watched Trains*, and *Too Loud a Solitude* from the repressive periods of

World War I, World War II, and Communist control.

A Tail's Tale: ErbB Structure, Evolution, and Function
Amar Mirza – CURO Scholar, CURO Summer Research Fellow
Science as Art
Dr. Natarajan Kannan, Department of Biochemistry & Molecular Biology, University of Georgia

Epidermal Growth Factor Receptor (EGFR), a multi-domain receptor tyrosine kinase, is the most frequently mutated tyrosine kinase in all human cancers. Activation of the cytoplasmic tyrosine kinase domain involves ligand-induced dimerization, conformational changes in the activation-loop, movement of the C-Helix, interlobe movement, and myriad other events. Coordination of all of the aforementioned events is critical for kinase activity, but existing methods (NMR and MD simulations) are not yet powerful enough to provide an explanation. To tease apart the details of this protein's regulation, we have constructed contrast-hierarchical alignments to identify specific amino acids which are most critical for EGFR and related kinase function. The biological relevance of these amino acid residues was uncovered by mapping them onto existing crystal structures of EGFR. It was found that segments of the N and C- terminal tail flanking the kinase core are distinguishing features of EGFR that have co-evolved with the kinase domain and are now an integral part of the kinase core. These flanking segments were found to be critical for controlling interlobe movement, ATP-binding, C-Helix positioning, symmetric and asymmetric dimerization, and activation-loop stabilization. These results elucidate previous experimental data that pointed toward a regulatory role for these regions. The results of this work have laid the ground-work for the development of novel allosteric inhibitors for the treatment of cancer, and this investigation has further characterized the effect of one of the most frequent mutations found in cancerous tissue.

Using miRIDIAN miRNA Mimics and Inhibitors for Evaluating the Contribution of Host miRNA Regulation of Respiratory Syncytial Virus (RSV) Replication
Patricia Mitchell – CURO Apprentice
Dr. Ralph Tripp, Department of Infectious Diseases, University of Georgia

Respiratory syncytial virus (RSV) infection causes substantial morbidity and some deaths in the young and elderly worldwide. There is currently no safe and effective vaccine available. RSV causes repeat infections throughout life, a feature in part attributed to virus gene regulation of the host immune response. Little is known about the host gene response to RSV infection, or the mechanism by which host genes are regulated. Recently, microRNAs (miRNA) have been shown to have a critical role in host gene regulation, cell differentiation, proliferation, and apoptosis. In this study, miRNA regulation of the host gene response to RSV infection was investigated using a panel of miRNA agonists and antagonists. Human respiratory epithelial cells (A549 cells) were transfected with specific miRNA mimics and inhibitors that were indicated by our experimentation using microarray analysis to be important in the response to RSV infection, specifically let-7f, miR 26b, miR 595, miR 24, miR 198, miR 224, and miR 337. The results confirm that some of these miRNAs are important in the host response to RSV infection and offer new insights into disease intervention strategies to control RSV-mediated disease pathogenesis. Recently it has been shown that miRNA could have a role in the treatment of pancreatic cancer and heart disease.

Racial and Skin Tone Differences in Facial Thermography and Self-Reported Emotion in Response to Visual Stimuli
Trenton Mize & Tré Myers
Dr. Dawn Robinson, Department of Sociology, University of Georgia

An emerging technique for studying emotions involves the measurement of facial temperature using infrared thermography. We focus on possible systematic differences in facial temperature as a function of participant's race.

This study used data from 82 women and 68 men who participated in a study of "Pictures and Feelings." Sixty-one participants self-reported as "white," and 21 self-reported as "black." Participants viewed images and completed self-report emotional measurements while their facial temperature was measured using infrared thermography. Images varied systematically in their capacity to elicit feelings of potency and activity in a 2 (potency: high, low) x 2 (activity: high, low) factorial design. The emotion manipulations were derived from the International Affective Picture System (IAPS). Based on previous literature, we predicted some differences in emotion as a function of self-reported race. These predictions were not supported. We analyzed differences in facial temperature throughout the experiment as a function of self-reported race. We found consistent differences in facial temperature by race across all images and all facial regions, with no interactions by facial region or image set. We also found a few differences in self-reported emotion by race but no differences that would explain the consistent temperatures differences. We believe that the facial temperature differences observed were due to different skin tone emissivities, which would cause lighter or darker skin tones to be read at different temperatures by the infrared camera. We present further analyses to test this possibility. These results could be important to consider when studying emotions across races and ethnicities.

The Local Weather: The Effects of Construal Level and Weather on Self-Control

Paul Moon
Dr. Michelle vanDellen, Department of Psychology, University of Georgia

Research on Construal Level Theory indicates that people process information on two levels: local and global. Locally, people are concerned with immediate consequences of behavior, whereas globally, people are concerned with future consequences. We were interested in whether construal level might affect how people process positive and negative information when they need to exert self-control and whether these decisions would be affected by situational factors. We recruited participants to complete a study regarding self-control decisions and recorded the weather each day of data collection. Through a Navon letters task, participants were randomly assigned to process information globally or locally. Afterward, they read a text that either highlighted the consequences or benefits of taking a zinc tablet. Trying zinc is an approach version of self-control because its benefits are at odds with its consequences. Next, participants rated their opinions of zinc and were asked if they would like to try the zinc. We had zinc available for those who wanted to try it. Results indicated that weather on the day of experimental session moderated the effect of construal level on participants' likelihood of trying the zinc. Participants were more likely to accept zinc if they had been locally primed and if it was raining that day. These results suggest that self-control could be based on environmental conditions and also construal level. This may be because when focused locally and when weather was bad, participants were more aware of the potential of getting a cold due to the rain.

Queens of Scream: The Making of Horror Film Heroines

Jill Moore
Dr. Katalin Medvedev, Institute for Women's Studies, University of Georgia

Since its inception, the film industry has greatly influenced fashion and society in America. Movies provide a recorded history of the culture that produces them. The way we view characters in film also speaks to our culture's preconceptions about gender roles. Out of all film genres, horror generates the most controversy. Horror pushes the boundaries of what is socially acceptable and forces the viewer to face the darkest facets of human nature. The visual portrayal of characters is much more important in horror films than in any other film genre because dialogue and character development are less important. How are women depicted in scary movies, and why? What does the portrayal of women in horror films say about expected gender roles in American society, and how does it challenge them? How have female

characters in horror films changed over time? These are the questions that I am exploring through the examination of "slasher" films. I chose this type of horror film because they depict real people more accurately than other horror subgenres. Many critics in the field of women's studies contend that horror films are misogynistic and exploitative towards women. In my paper, I hope to propose a different perspective and show how horror films may actually empower them. To write my paper, I have reviewed numerous sources on film theory, gender studies, and director perspectives and applied their theoretical frameworks to the most important films in the "slasher" genre.

The Epidemiology of *Staphylococcus aureus* in Kentucky and Georgia from 1995 to 2003

Tatum Mortimer
Dr. Susan Sanchez, Department of Infectious Diseases, University of Georgia

Methicillin-resistant *Staphylococcus aureus,* MRSA, is a growing problem in medical and veterinary fields as antibiotic resistant infections can be difficult to treat. The epidemiology of equine MRSA has been little studied to date. Our purpose was to study the epidemiology of equine *S. aureus* from Kentucky, where the racing industry predominates, and from Georgia's primarily recreational population. Clinical isolates of *S. aureus* were collected from horses in Kentucky and Georgia from 1995 to 2003. Pulsed field gel electrophoresis was used to create patterns of digested DNA from the isolates, which were compared to each other and twelve known human controls. We found that 65% of Kentucky isolates were MRSA compared to 18% in Georgia. The differences between the patterns were counted, and BioNumerics was used to create dendrograms of the samples. Analysis revealed that 60% of the MRSA isolates were closely related and 25% of the MRSA isolates were possibly related to the strain type USA500. Methicillin-sensitive *S. aureus* isolates showed a greater genetic variety, and only 10% of those isolates were possibly related to USA500. Urinary and reproductive isolates from Kentucky had the highest incidence of MRSA at 70%. The genetic resemblance of the MRSA isolates suggests that many of the isolates have a similar source, possibly the USA500 strain that presents itself in the human population. The markedly higher frequency of MRSA in the Kentucky isolates indicates that the husbandry and management of the racing horses aided in spreading MRSA more effectively than that of individually owned leisure horses.

Energy Efficiency Funding in Athens-Clarke County

Saptarsi Mukhopadhyay – Roosevelt at UGA
Dr. Tyra Byers, Odum School of Ecology, University of Georgia

Athens-Clarke County's (ACC) tax revenues have shrunk dramatically due to the weak economy. Consequently, ACC needs to reduce expenses to balance its budget as mandated by state laws. Energy costs are an ideal target for reducing overall costs. They are embedded in the costs of providing all services and can be cut with little adverse effect on the quality or extent of services provided. Through the implementation of various types of economically efficient energy upgrades, energy usage and costs can be reduced. To realize potential energy usage and cost savings fully, all upgrades need to be conducted simultaneously. The nature of energy efficiency projects is synergistic; different upgrades working in conjunction conserve more energy and money than would seem to be indicated simply by the sum of their individual effects. Hence, if all of these projects are not pursued in parallel, maximum potential savings simply cannot be realized. Unfortunately, ACC currently does not realize the maximum potential savings in energy costs due to its current piecemeal method of funding these projects. ACC should create a $500,000 "Energy Bank" based on a similar plan in place at Chapel Hill, NC through the issuing of municipal bonds and a process to use this fund for energy efficiency upgrades in public buildings to address these policy failures. This sustainable and stable source of long-term funding should allow all economically efficient energy efficiency upgrades to be implemented to achieve maximal cost savings, reducing the cost

of proving services and ultimately increasing social welfare.

Keeping PACE: Clean Energy Financing for Athens-Clarke County
Bryn Murphy – Roosevelt at UGA
Dr. Andrew Carswell, Department of Family & Consumer Sciences, University of Georgia

The Property Assessed Clean Energy ("PACE") financing program is a financial tool designed to make clean energy home improvements more accessible to homeowners. Through the PACE program, participating state and local governments offer funding through a municipal bond to eligible homeowners to cover the up-front costs of home energy retrofits. Homeowners then repay their loans through an additional periodic assessment on their property taxes. These energy retrofits not only lower a household's carbon emissions but also produce savings on homeowners' water and energy bills by ensuring that anticipated utility bill savings outweigh anticipated additional property tax assessments. This research seeks to determine the level of interest in the PACE program in Athens-Clarke County, and, if such interest is present, to adapt the program to better fit local concerns and conditions. Participants in a local class for new homebuyers were surveyed on their level of interest in the PACE program and level of attraction or aversion to specific components of the program (quantitative). Their specific comments and suggestions were also elicited (qualitative). The anticipated results of the survey include general interest in the PACE program but concern with specific components of the program, such as eligibility requirements, potential financial risk to homeowners, and perceived incompatibility of the PACE program with Athens-Clarke County's high percentage of renter-occupied property. An adaptation of the PACE program to meet local people's concerns has the potential to increase access to the benefits of clean energy in Athens-Clarke County and in demographically similar communities nationwide.

The Effect of U.S. Military Aid on Recipient State Cooperation in Pakistan: A Case Study
Emily Myers – CURO Summer Research Fellow
Dr. Patricia Sullivan, Department of International Affairs, University of Georgia

What is the effect of U.S. military aid on Pakistan's cooperation with United States foreign policy? If Pakistan does not always cooperate with the U.S. foreign policy objectives, why does the U.S. continue to fund them with massive amounts of military assistance? This study seeks to explain the phenomenon that as the United States gives Pakistan more military aid, Pakistan becomes less willing to cooperate with U.S. foreign policy goals. Key sources are U.S. legislation, transcripts of congressional hearings, Congressional Research Service (CRS) Reports, news articles from *The New York Times* and other major newspapers, and existing literature on U.S. military aid. These sources are used to analyze the relationship between the United States and Pakistan by explaining how U.S. military aid is generally allocated and how the U.S. government justifies giving aid, describing how U.S. military assistance to Pakistan has changed over time, tracking U.S. legislation, and discussing past problems the U.S. has encountered with countries to whom it has provided aid.

Epigenetic Effects of Bromate on p21 and Histone-2AX Expression in HEK293 Cells
Krelin Naidu
Dr. Brian Cummings, Department of Pharmacology & Toxicology, University of Georgia

The epigenetic effects of bromate (BrO3-) exposure in human embryonic kidney 293 (HEK293) cells were investigated. BrO3- is a byproduct of ground water disinfection procedures (oozonation). It has been designated a possible human carcinogen by the International Agency for Research on Cancer. BrO3- treatment (10 – 200 ppm) causes damage to HEK293 cells based on cell death assays and significant increases in specific regulatory proteins (e.g., p53, cdc2) in HEK 293 cells over

72 hours. Additionally, bromate-induced epigenetic changes were assessed by increased expression of phosphorylated histone-2AX (H2AX), a histone correlated with DNA damage that facilitates DNA repair. BrO3- exposure also led to a G2/M cell cycle arrest that correlated to increased expression of tumor suppressor gene, p-p53, and other regulatory genes p-p38, p21, cyclin B1, and p-cdc2. Treatment of cells for 48-hour low concentrations (1 – 100 ppm) showed similar trends in protein expression levels. This suggests that bromate's toxicity may lead to epigenetic alterations. To confirm the epigenetic changes, methylation specific PCR after bisulfite conversion will be conducted to assess the suspected methylation of specific cell cycle regulation proteins such as p21. Preliminary studies demonstrate that bromate treatment of human embryonic kidney 293 cells alters the methylation status of p21 and increases in the phosphorylation of H2AX. These modifications in DNA methylation and histone expression levels support the hypothesis that bromate, at low levels, induces epigenetic changes in both *in vivo* and *in vitro* models of toxicity.

Examination of Resuscitation-Promoting Factors in Potential Fish Pathogens in *Mycobacterium shottsii* and *M. pseudoshottsii*
Johnathon Nolen
Dr. Russell Karls, Department of Infectious Diseases, University of Georgia

Defining mechanisms of gene regulation is critical for understanding how pathogenic mycobacteria survive in diverse environments and to identify novel drug targets. For the human pathogen *Mycobacterium tuberculosis*, resuscitation factors are believed to play an important role in primary infections as well as for reactivation of latent infections. The main goal of the project is to identify the inter-species conservation and function of an important resuscitation-promoting factor (Rpf) from recently identified potential fish pathogens *Mycobacterium shottsii* and *Mycobacterium pseudoshottsii*. A significant impediment in mycobacterial research is the slow growth of these microbes *in vitro*, necessitating very long incubations that sometimes take months for appreciable growth. This research investigates whether RpfB proteins accelerate growth *in vitro* and whether Rpf proteins from one *Mycobacterium* species impact the growth of others. As proteins from this class are secreted into culture media, culture filtrates from aged bacterial cultures are tested for growth stimulation of low-density mycobacterial cultures. Recently, RpfB from *M. tuberculosis* H37Rv was over-expressed in *E. coli* strain CH3λDE3 and purified using Ni^{+2}- NTA chromatography. Further tests for growth stimulation are in progress. This research is beneficial in that Rpf proteins could potentially be used as a diagnostic marker for *M. tuberculosis* infection and may be helpful for diagnosing latent infections. Also, use of purified Rpf proteins may help accelerate culture of *M. tuberculosis* in sputum, thereby aiding in more-rapid diagnosis and treatment.

Reining in the Drone Wars: Creating Criteria for the C.I.A. Drone Program in Pakistan
Tony Pelli – Roosevelt at UGA
Dr. Fred Manget, Department of International Affairs, University of Georgia

In 2006, the United States Central Intelligence Agency (C.I.A.) began a covert action campaign, authorized by the President, to eliminate Al Qaeda and Taliban leadership in western Pakistan using armed unmanned aerial vehicles, commonly referred to as drone strikes. The C.I.A. chooses targets and executes the strikes with little oversight from other governmental bodies. This paper analyzes the efficacy and efficiency of the U.S. drone program and the corresponding number of unintended civilian deaths, as well as the change in those numbers since 2006. Examining arguments about the nature of conflict in Pakistan and clandestine action, as well as the aforementioned trends in casualty numbers from counterinsurgency and intelligence experts and legal scholars, this paper determines that the C.I.A. drone program needs greater oversight to be effective. The paper proposes that Congress separate the program's budget from the normal covert action budget, giving Congress greater oversight, and articulates specific criteria for the

targeting of drone strikes, most importantly ensuring that the target list for the strikes is restricted to leaders of Al Qaeda and the Taliban. Finally, this paper proposes a system—roughly following existing guidelines for other covert actions—by which certain, selected members of Congress will be informed of individual drone strikes. These changes will ensure that drone strikes are used sparingly to target only the most high-value targets, reducing Pakistani opposition to American goals in the region. Decreasing Pakistani resistance will enhance U.S. anti-terror strategies in one of the most crucial regions in America's struggle against transnational terrorism. Additionally, proposed changes will allow for greater democratic accountability and oversight of a previously clandestine program.

The Mixed Model of National Power and the Power Parity between the United States and China

Chadwick Peltier
Dr. Brock Tessman, Department of International Affairs, University of Georgia

Power Transition Theory suggests that the likelihood of conflict is greatest when the ratio of the challenging state's capabilities to those of the dominant state's is within 20 percent. Have the United States and China reached this critical range of power parity? In this study I will describe the relative powers of the United States and China as well as the relative power of the Group of Twenty (G20) member states in the year 2001. After assessing the strengths and weaknesses of each historical paradigm for understanding power, I propose a new model, called the Mixed Model of National Power, which is based upon two principles. First, each variable measures a distinct aspect of national power statistically and conceptually. Second, the formula seeks an appropriate tradeoff between accuracy in measurement and parsimony in the number of variables. Because univariate measures fail to capture all of a state's capabilities, six variables—GDP, healthy life expectancy, total population, urban population, total internet users, and environmental sustainability scores—are used that cover elements of hard and soft power, incorporate size and development variables, and balance between economic and military strengths but avoid the use of hundreds of variables. Based upon my results, I conclude that China and the United States have reached the critical point of relative power parity where conflict is most likely, and I explore the reasons and implications of this find to policy makers.

Identifying Human and Avian Influenza Binding Sites in Clam Tissue

Ariella Perry
Dr. Elizabeth Howerth, Department of Pathology, University of Georgia

Clams can remove large quantities of avian influenza virus from water within a small interval of time, leading to total water purification. However, how removal occurs is unknown, nor why clams themselves do not develop signs of infection. The goal of this project was to determine if clams have cell-surface receptors that will bind avian and/or human influenza viruses and could account for water purification. Via lectin immunofluorescence and immunohistochemistry techniques, we evaluated the presence of sialic acids in the alpha-2,6 linkage (human influenza virus receptor) with *Sambucus nigra* and sialic acids in the alpha-2,3 linkage (avian influenza virus receptor) with *Maackia amurensis* I and *Maackia amurensis* II in clam tissue. The results suggest that lectins attached to cillia covering the foot, mantle, and gills of individual Asiatic clams, indicating that removal of avian influenza from contaminated water is through attachment to ciliated surfaces. Verification that avian, but not human, influenza virus attach to these specific surfaces is pending. In the identification and attachment of the avian influenza virus, further understanding can be rendered as to the process of clams' purification of the water. These techniques could be implemented in the future for the purification of avian influenza virus from various media.

The Genetic Alteration of Soybean to Promote the Production of Astaxanthin
Emily Pierce – CURO Summer Research Fellow
Dr. Wayne Parrott, Department of Crop & Soil Sciences, University of Georgia

Carotenoids are pigments that range in color from yellow to red and that provide health benefits and coloration to a variety of organisms. Animals cannot synthesize carotenoids and must obtain them from their diet. Astaxanthin is one of the more important carotenoids and is added to the feed of salmon, shrimp, chickens and layer hens. However, astaxanthin supplements can account for 15 to 25% of the producers' feed costs. Since these animals are fed soy concentrate, the goal of this research is to genetically engineer soybean to produce astaxanthin and thus reduce producers' costs. The genes for astaxanthin production were obtained from two astaxanthin-producing bacteria and a yeast. The first gene (*crtB*) allows soybean to form β-carotene. Then, astaxanthin is produced from β-carotene via the action of genes *crtW* and *crtZ,* or alternatively, via another gene called *crtS*. Both of these alternatives are being tested in soybean. Analysis of the engineered soybean using thin-layer chromatography showed they produce β-carotene but not astaxanthin. Therefore, current work is trying to determine why there is a lack of astaxanthin formation. Results of this research should be economically valuable and may provide insight into metabolic engineering of soybean.

Estimating Detection Rates and Determining Site Occupancy of *Urspelerpes brucei* (the Patch-Nosed Salamander)
Todd Pierson
Dr. John Maerz, Warnell School of Forestry & Natural Resources, University of Georgia

In March 2007, University of Georgia researchers stumbled upon a new species of Plethodontid salamander, *Urspelerpes brucei* (the Patch-Nosed Salamander), in the Appalachian foothills of northern Georgia. While the discovery of the salamander is impressive in itself, very little additional knowledge has been gathered about its life history. So far, this species is known from only a handful of sites, all of which are within a several-mile radius of the type locale. To develop a plan of management for this new species, a better understanding of its life history and range must be gained. However, the presence of *U. brucei* at a given site can often be difficult to determine due to its secretive nature, and a system for determining site occupancy is in need of development. Because this small, cryptic species is often hard to detect, we will use a combination of leaf-litter traps and dip netting to estimate detection rates of *U. brucei* over time in streams that it is known to inhabit. Quantifying and understanding imperfect detection rates of *U. brucei* will allow us to effectively survey new sites for the species and determine occupancy across its potential range. Obtaining a more complete understanding of stream occupancy and range of *U. brucei* is critical in developing a plan of management for its conservation.

Measures of Working Memory: The Relationship Between Performance on the Operation Span Task and the Ocular Motor Delayed Response Task
Rachel Pocock
Dr. Jennifer McDowell, Department of Psychology, University of Georgia

Working memory (WM) is an important aspect of daily life and is associated with various measures of academic success, such as reading comprehension and reasoning ability. One standard measure of WM is the operation-span (OSPAN) task, which requires participants to complete a series of math operations while simultaneously remembering a particular sequence of letters. WM also can be evaluated by certain eye movement tasks, specifically an ocular motor delayed response (ODR) task. An ODR task requires that subjects remember the location of a target during a delay period and then move their eyes to the remembered location (i.e., "memory saccade"). Performance can be assessed by 1) evaluating the spatial accuracy of the memory saccade and 2) the frequency of saccades made before the delay period is over

("anticipatory saccades") using a video-based eye tracking system. Performance on the OSPAN task can predict performance on other eye movement tasks, but its relation to ODR is yet to be determined. Data from the OSPAN and ODR tasks will be collected from 40 undergraduate students at the University of Georgia. It is hypothesized that scores on the OSPAN task will be correlated with performance on the ODR task. Specifically, high OSPAN scores (indicating greater WM capacity) will be associated with better performance on the ODR task, as indicated by higher spatial accuracy and fewer anticipatory errors. These results may help researchers determine which tasks to use when assessing WM of participants with and without memory problems and may also explain the differences in results from studies utilizing different measures of WM.

Forbidden Fruit: Reforming the Penalties for the Importation and Distribution of Contaminated Produce

Shayna Pollock – Roosevelt at UGA
Dr. Lewell Gunter, Department of Agricultural & Applied Economics, University of Georgia

From 1993 to 2008, the U.S. saw an increase in the importation of fresh fruit from 10 percent to 32 percent of all domestically consumed produce. The Food and Drug Administration (FDA) and U.S. Customs monitor imports by randomly testing 5 percent of all produce, but they cannot control the pesticides used in other countries. Thus, the safety of imports is unreliable. According to the FDA, six percent of imports contain illegal pesticide residues, but the current system of bonds is ineffective in keeping this produce away from consumers. A 1992 Government Accountability Office report shows that 60 percent of all tainted imported produce reaches grocery stores despite knowledge of contamination. Based on an extrapolation using current import size, approximately 400-480 thousand metric tons of contaminated produce reached Americans in 2006. However, only 17 percent of the companies distributing tainted food paid damages. Thus, current regulations do not deter companies. After a literature review and analysis of current policy failures, this paper proposes that Congress should grant the FDA the ability to implement a system of civil fines. The fine schedule should consist of two sets of fines: one for the importation of a tainted good and a second for the distribution of contaminated produce. This civil fine system will promote self-regulation. While this new regulatory framework will result in potentially higher costs, this paper demonstrates methods for evaluating the significant social health benefits of reduced pesticide exposure. Further, a stricter system will lead to more sustainable international agriculture.

The Impact of Speech Impairment on Head Start Children's Social Emotional Competence

Leah Prestwood, Kiara Jones & Evin Winkelman
Dr. Tsu-Ming Chiang, Department of Psychology, Georgia College & State University

Specific Language Impairment (SLI) is a language disorder that is not related to or caused by other developmental disorders such as hearing loss or acquired brain injury. Pragmatic difficulties that negatively influence effective social interactions have been found to be experienced by children with language impairments. Children with SLI experienced more difficulty in recognizing what emotion a social scenario might elicit in an inference task and pose greater risks for social problems. The current study is thus designed to examine the impact of SLI on young children's social emotional competence. Data from 21 Head Start children (7 girls) with ages ranging from 35 months to 47 months, collected by a larger study, were analyzed in the present study. Among these children nominated by their teachers in displaying a wide range of social emotional issues, nine children's language ability was below average. Teachers were asked to fill out Social Competence Behavioral Evaluations (SCBE) developed by LaFreniere. The results showed children who lack speech ability were more likely to be reported as timid sad/withdrawn ($r = .573$, $p = .016$) and to be rated by teachers using SCBE as isolated ($r = .553$, $p = .026$) and less social ($r = .504$, $p =$

.046). ANOVA results also revealed that speech significantly placed these children at risk of being isolated [$F(1, 18) = 6.83$, $p = .018$], dependent [$F(1, 18) = 7.432$, $p = .014$] and less social [$F(1, 18) = 8.297$, $p = .01$]. Implications and future steps will be addressed at the Symposium.

Humanities in Medicine

Ryan Prior
Dr. Katarzyna Jerzak, Department of Comparative Literature, University of Georgia

In his book, *Hot, Flat, and Crowded*, Thomas Friedman discusses how in traditional South African societies, those with chronic illness who sought treatment from healers were not instructed to take elixirs or remedies but were instead instructed to cook a meal for the entire village. The idea was that patients could help themselves by helping others. These societies realized that chronic illnesses were often the result of problems of the heart and successfully managed them in ways that might confuse the traditional Western medical establishment. Most people today think of medicine in terms of pills, surgery, and needles, but a survey of various civilizations' health traditions reveals highly sophisticated and surprisingly accurate ideas about how the human body works and how it can be treated that range from yogic meditation to herbal tea remedies. Like Western medicine, Chinese Traditional Medicine and Indian Ayurvedic medicine have developed over thousands of years. Practitioners of these systems glean their insights not so much with CAT scans and T-cell counts, however, as they do by examining the color and shape of a patient's tongue. This project began as an intended research paper but gradually evolved into a creative work that melded personal narrative and literary analysis to the initial philosophical questions. Because the quest for healing does not stop with scientific medicine but requires moral and spiritual satisfaction as well it is only through telling our own stories that we can ultimately find the healing we seek.

Castro as a Capitalist: The Role of Foreign Investment in Cuba

Lucas Puente
Dr. Maurits van der Veen, Department of International Affairs, University of Georgia

The collapse of the U.S.S.R. and the subsequent dissolving of its Council for Mutual Economic Assistance led to Cuba's "Special Period," in which investment in the domestic economy and access to foreign exchange disappeared. This forced the Castro regime to reevaluate its development policy and, for the first time, actively seek and promote foreign direct investment (FDI). Nevertheless, Cuba has refrained from providing a laissez-faire marketplace for foreign firms and investors; on the contrary, the Castro regime has been determined to regulate and control this investment as much as possible. As per the existing literature, this strategy is imprudent as FDI has been shown to have had a generally positive influence on several economic and political factors, such as growth, wages, civil liberties, and political empowerment. Given these self-imposed constraints, FDI's ability to engender change is expected to have produced much less impressive results in Cuba. Although I expect to find that this expansion of FDI has been a net positive in terms of promoting economic growth, its capacity to improve domestic human development and expand political freedoms appears to have been hindered. To determine the precise nature of this impact, I am examining sub-national data sets regarding the current nature of foreign investment in Cuba. Regression analysis will also be utilized to better understand the changes resulting from inflows of FDI.

Blood Velocity at Rest and After Ischemia

Rejina Pumachcharige
Dr. Kevin McCully, Department of Kinesiology, University of Georgia

Flow mediated dilation (FMD) is commonly used to measure vascular disease. FMD assumes that the blood velocity profile across the artery is constant. However, blood viscosity and wall "stickiness" can change with vascular disease.

This study will evaluate changes in the velocity profile of the femoral artery in healthy humans before and after a high-fat meal. The high-fat meal is hypothesized to alter the blood velocity profile. IRB approval will be obtained (under review), and healthy subjects (18-35 years old) will be recruited into the study. Eight subjects will rest for 10 minutes prior to resting measurements of the femoral artery velocity and diameter using an ultrasound unit. A cuff will then be placed below the subject's knee and be inflated for five minutes to occlude blood flow. The cuff will then be released and velocity and diameter will be measured during hyperemia. After the baseline measurement, the subjects will eat a high-fat meal consisting of "fast food" containing 1 gram of fat per 1 kilogram of body weight. The ultrasound measurements will be repeated two and three hours after the meal. The hypothesis is that fat in the blood will cause an increase in the standard deviation of instantaneous velocity measurements (the velocity profile).

Imagination and Institution: The Effects of Surrealism and Catholicism on the Work of Oscar Dominguez

Sarah Quinn
Dr. Janice Simon, Department of Art History, University of Georgia

The surrealist art movement emerged during the 1920s. Building on the previous Dada period, this style drew from numerous sources. Contemporary Freudian philosophy's investigation of the dynamic between the conscious and unconscious mind most notably figured in the development of the surrealist aesthetic. The work of the Spanish surrealist artist Oscar Dominguez exhibits these qualities while also proposing a unique intersection of cultural influences. Dominguez worked primarily in Paris, the center of Dadaism and home to the prominent surrealist theorist Andr Breton, but was born and raised in the traditionally Catholic country of Spain. This research aims to investigate the extent of Catholicism's influence on Dominguez's surrealist art through his implementation of symbols, motifs, theoretical references, and formal decisions. Previous research aligns surrealist philosophy and practice with the ancient concept of the sacred and the meditative capacity of mysticism. Catholicism's specific influence on the development of surrealist imagery, however, has yet to be examined in depth. Because of the paradoxical interconnectedness of the Freudian imagination, an idea perpetuated in France, and the institution of religion, supported by Spain, Dominguez's art could potentially serve as a unique visual union of progressive surrealist thought and traditional Catholic belief. A close examination of Breton's *Surrealist Manifesto*, Freud's *Interpretation of Dreams*, 20th century Catholic doctrine, and other relevant texts could provide greater insight into the enigmatic visual representations of surrealist thought.

Development of a Modified System to Create Mutations in *Mycobacterium tuberculosis*

Akanksha Rajeurs – CURO Apprentice, CURO Summer Research Fellow
Dr. Russell Karls, Department of Infectious Diseases, University of Georgia

One-third of the world population is infected with *Mycobacterium tuberculosis*. Annually, seven to nine million infected individuals suffer from active tuberculosis disease (TB), resulting in ~two million deaths. The current TB vaccine, *Mycobacterium bovis* BCG, is rarely used in the U.S. because of variable efficacy (0-80%) against pulmonary TB. Attenuating *M. tuberculosis* to produce a more-effective, safe, live vaccine will likely require deletion of multiple virulence factor genes from the chromosome. Current selection systems to delete genes from this bacterium replace the target gene with an antibiotic resistance gene. As a vaccine strain encoding multiple antibiotic resistances may lead to transfer of antibiotic resistance genes to other bacteria, our hypothesis is that we can develop a modified system to 1) replace a chromosomal gene with a gene cassette that will facilitate the study of the resulting mutants and 2) utilize a feature of the cassette to select for mutants that have deleted the cassette from the chromosome. This is a multi-step process to generate a pair of plasmids with

specific features. To develop these plasmids, multiple DNA cloning steps and PCR amplifications were performed. After each cloning step, plasmid DNAs were isolated and screened by restriction analysis. DNA sequencing was used for confirmation. Efforts are in progress to modify the plasmids to target a natural antibiotic resistance gene in *M. tuberculosis* and *M. bovis* BCG. Deletion of this gene will result in bacteria that can be killed by the antibiotic.

Epidemiology of *Salmonella enterica* Typhimurium in Songbirds in the Southeastern United States

Al W. Ray III – CURO Apprentice, CURO Summer Research Fellow
Dr. Susan Sanchez, Department of Infectious Diseases, University of Georgia

Salmonella enterica serovar Typhimurium outbreaks of unknown origin have plagued passerines, more commonly known as songbirds, for years, causing significant mortality in the wild. The illness is marked by enteritis with esophageal lesions, generally a clinical presentation not seen in other avian groups, including psittacines or gallinaceous birds—chickens and turkeys. These outbreaks have a devastating ecological impact on bird populations and might prove a significant threat to public health. These epizootic outbreaks are seasonal, occurring most frequently in winter and early spring. We do not know how *Salmonella* Typhimurium is transmitted in the wild bird population, the environmental reservoir, or factors responsible for these wild bird die-offs. During 2009, we observed a significant epizootic outbreak of *S.* Typhimurium in songbirds, especially in Pine Siskins. By Pulsed-Field Gel Electrophoresis (PFGE), we identified the same *S.* Typhimurium strain isolated from Pine Siskins and other passerines in multiple Southeastern states including Georgia, Tennessee, and North Carolina. In a retrospective comparison of this *S.* Typhimurium strain to an archival collection of *S.* Typhimurium from multiple animal sources, we found PFGE matches with songbird isolates from as far back as 1996. This strain appeared to be unrelated to *S.* Typhimurium strains isolated from other avian species, most notably psittacines and gallinaceous birds, and cattle.

Primary Transmission of *Salmonella* Contamination in Poultry Meat

Nick Regenold, E. N. Foxhall III, S. Frimpong, O. Grey, M. Kallaoun, J. Mansour & N. Wang
Dr. John Maurer, Department of Microbiology, University of Georgia

Salmonella is the leading cause of human food borne illnesses in the United States. Poultry has been implicated through multiple epidemiological studies as the major source of *Salmonella* outbreaks. In the United States, individual poultry companies control production from the parent flocks to their progeny to the slaughterhouse. *Salmonella* can be transmitted horizontally or vertically. Horizontal transmission occurs when the bird acquires *Salmonella* through direct interactions with its environment at any stage in poultry production. Vertical transmission occurs when *Salmonella* is passed from an infected parent to its progeny. We hypothesized that *Salmonella* contamination of chicken carcasses is due mainly to the vertical transmission of *Salmonella* from the primary parent flocks. *Salmonella* isolates were collected from poultry farms, contracted with two different companies, to identify the source of chicken carcass contamination within this poultry production system. Pulsed-Field Gel Electrophoreses (PFGE) are being performed to compare DNA fingerprints of specific *Salmonella* isolates from parent flocks and progeny to determine the type of transmission involved in carcass contamination. A total of 7630 samples were collected, from which 1642 were *Salmonella* positive. Statistical analyses indicate a strong role of vertical transmission in *Salmonella* dissemination within the companies. Quantification will be possible when PFGE profiles are available for all samples. After evaluation of our results, we can determine where to implement intervention strategies to limit *Salmonella* transmission. Further analyses can be done with the PFGE fingerprint databases at the Centers for Disease Control and Prevention (CDC) to determine the link between

poultry contamination with *Salmonella* and human disease.

Spiritual Life: Self-Transformation in the Ancient and Modern World
Joe Reynolds – CURO Scholar, CURO Summer Research Fellow
Dr. Frank Harrison, Department of Philosophy, University of Georgia

With the human population continuing to expand, a global society is on the horizon, if it is not already here. Global peace is a genuine concern, and religious fundamentalists and extremists threaten it in the name of their beliefs. The question then becomes—how can a global society exist and maintain peace when it contains religions with disruptive beliefs? This research intends to focus on one major religion, Christianity, and will explore writings of influential leaders in the Church to determine if the actions of fundamentalists are justified. First, it will discuss the rise of fundamentalism in modern Christianity. Then, it will discuss the position of Christianity in history, and especially how it was preceded and shaped by the Platonic tradition. Following this, it will look at the work of Pierre Hadot, a modern philosopher who claims the Platonic and Christian tradition are united in their spiritual exercises. Spirituality, from Hadot's point of view, is focused on the transformation of the entire human being, including her desire, intentions, and outlook on life. Finally, the research will determine if this viewpoint is justified by looking at the role of sin in separating us from God and how God transcends any symbol or conception. The research will emphasize the need for a re-evaluation of the role of spirituality in modern society, not as a set of beliefs but as a process of maintaining the human spirit. This is especially relevant given the mental health issues that currently plague our youth.

Respiratory Syncytial Virus G Protein Heparin-Binding Domain Interaction with Cell Surface Glycosaminoglycans Facilitate CX3C Chemokine Receptor Mimicry
Joseph Rimando
Dr. Ralph Tripp, Department of Infectious Diseases, University of Georgia

Respiratory syncytial virus (RSV) is a primary cause of severe lower respiratory illness in infants and children worldwide, also causing substantial disease in the elderly and immune-compromised populations. Previous research has shown that the RSV attachment (G) protein interacts with the CX3C chemokine receptor (CX3CR1) during the infection process to modify anti-viral immunity linked to the activities of fractalkine (CX3CL1), the natural ligand of CX3CR1. Evidence suggests that the G protein-CX3CR1 interaction is mediated in part by heparin-binding domains (HBD) on the G protein with glycosaminoglycans (GAG) on the host cell membrane. In this study, we investigate the role that several important members of the GAG family have in facilitating G protein binding to CX3CR1. The studies examine HBD-GAG interaction using flow cytometry to measure the level of G protein binding to CX3CR1 expressed on both wild type Chinese hamster ovary (CHO) cell lines and on multiple mutant CHO cell lines lacking certain GAGs. The preliminary results suggest that higher levels of RSV G protein bind to CX3CR1 expressed on wild type CHO cells than to CX3CR1 expressed on the mutant CHO cells. These preliminary results suggest that the G protein-CX3CR1 interaction is dependent on HBD-GAG association and that several GAG family members may be more important than others in facilitating the G protein-CX3CR1 interaction. Evidence from previous studies suggests that prevention of the RSV G protein-CX3CR1 interaction reduces RSV replication, and thus these GAG domains can be targeted as a novel disease intervention strategy to mitigate RSV disease pathogenesis.

Biogeography of *Triatoma sanguisuga* on two Barrier Islands off the Coast of Georgia, USA
Ashley Roden
Dr. Brian Forschler, Department of Entomology, University of Georgia

Triatoma sanguisuga is a known vector of *Trypanosoma cruzi*, the causal agent of Chagas' disease. Thirty-three *T. sanguisuga* adults and nymphs were collected at five sites on Cumberland Island and two sites on Sapelo Island in June and July 2009. The full length (699 base pairs) of the cytochrome oxidase II mitochondrial gene was sequenced for each specimen. Twelve unique haplotypes were identified, nine from Cumberland Island and three from Sapelo Island. Neighbor-joining and maximum parsimony analyses were used to establish phylogenetic relationships among the haplotypes. The analyses provided similar phylogenetic topologies with no distinct clades devoted to haplotypes from a single island. Nested clade analysis was also used to determine the haplotype network structure. Two haplotype networks were defined, and one contained only specimens found on Cumberland Island. The other network was a composite of specimens from both islands, with the ancestral haplotype from Sapelo Island. This pilot study is the first to illuminate relationships of *Triatoma* populations in the southeastern United States using the cytochrome oxidase II mitochondrial gene, while hinting at a cryptic species along the Georgia Coast.

The Importance of Peer Approval in the Sartorial Purchasing Patterns of University of Georgia Students
Mallory Roman
Dr. Katalin Medvedev, Department of Textiles, Merchandising & Interiors, University of Georgia

There is ample evidence that peer approval and group acceptance play a role in many social phenomena. This influence can manifest itself through the bystander effect, peer pressure, social facilitation, and in many other ways. However, dress as a means of social influence has been largely ignored. This study was designed to determine whether peer approval and group acceptance influence the sartorial purchases of college students and their participation in popular apparel trends on campus. The hypothesis, derived from Social Comparison theory and Social Impact theory, was that students' sartorial purchasing habits are considerably influenced by peers. To test this hypothesis, a survey was developed around 14 brand-name apparel items popular at UGA that solicited student response on the significance of peer approval in personal decision-making, perceptions of peers' purchasing motivations, personal feelings about peer approval, and personal involvement in popular trends. Results were analyzed using frequency statistics and categorization of responses. The majority of the respondents (85.96%) owned at least one item, and all respondents were aware of the popularity of the 14 items. In general, students were more likely to rate the behavior of others as more conforming than their own, which suggested that participation in the popular sartorial trends on campus is viewed as being driven by conformity. These results may hold significance for retailers in college towns making retail-buying decisions and serve as further evidence that peer approval can act as motivation for conforming behavior.

Writing in Conversation with the Traditional Narratives of Journey
Jane Rowden
Prof. Reginald McKnight, Department of English, University of Georgia

My research this semester focuses on the tradition of telling the story of one's travels and the significance that the journey holds for the traveler. My objective is to write my own creative work in a conversation with the existing literary canon. I am reading narratives of travel, from the *Epic of Gilgamesh* to Jack Kerouac's classic road novel, *On the Road*, with the research questions "What common themes and tropes are used in traditional narratives of journey, and how should I utilize them in my own work?" and "What are the common authorial voices in these traditional works, and how can I contribute to this literary

conversation?" I anticipate that each of these narratives will focus on the growth and change of the hero, and I intend to write a short story in which the hero's experiences impact his or her perspective toward the home. In my presentation, I will outline some of the common tropes (e.g., the road, the vehicle, obstacles) and explain their presentation in a few select pieces. I will address these questions in my presentation in addition to reading an excerpt from my piece.

Human Resistance to Infection by African Trypanosomes

Carla Rutherford
Dr. Stephen Hajduk, Department of Biochemistry & Molecular Biology, University of Georgia

Trypanosoma brucei brucei is a eukaryotic parasite that infects cattle and other mammals but is unable to infect humans due to the cytotoxic activity of a minor subclass of serum high-density lipoprotein called Trypanosome Lytic Factor (TLF). The mechanism of *T.b. brucei* killing by TLF is poorly understood. The cellular morphology of human serum or TLF-treated trypanosomes suggests two distinct phenotypes associated with cell death. To elucidate the mechanism of trypanosome killing by TLF, we undertook an analysis of the morphological changes associated with TLF treatment. Morphological changes associated with serum killing were examined using fixed cell imaging and time-lapse microscopy of live cells. Trypanosomes treated with freshly collected, high specific activity, human serum change rapidly in morphology, becoming "kite-shaped" prior to lysis. Treatment with serum having low killing activity, produced by prolonged storage or incubation at 62°C, resulted in the gradual formation of a large cytoplasmic vacuole and a delay in trypanosome killing (~16hrs). Immunofluorescence microscopy of cells treated with low activity serum suggests the vacuole is formed within endosomes and not lysosomes as previously reported. These studies support the hypothesis that TLF killing of trypanosomes involves the activity of multiple proteins and that one of these proteins may be selectively inactivated by heat treatment or storage, resulting in the distinct morphologies observed. Analysis of the morphological phenotypes of killing of the individual protein components of TLF may lead to a better understanding of the mechanisms underlying trypanosome killing by human serum.

The Biggest Loser: Restoring Self-Control After Rejection

Raha Sabet
Dr. Michelle vanDellen, Department of Psychology, University of Georgia

Previous research has indicated that social rejection leads to decreased self-control. Past research also suggests that after rejection, people become motivated to restore social connections. The hypothesis of this study was that motivation for social reconnection leads to increased performance on self-control tasks after rejection, if people think the tasks provide a chance to demonstrate social competence. We recruited participants from an undergraduate subject pool. When participants arrived, they were asked to complete a personality inventory. After completion, an experimenter supposedly scored the inventory. Participants then received accurate information about their level of extraversion. The experimenter also falsely informed participants that they would either live alone and have few social relationships or be unhappy in their future career. After receiving feedback, participants completed a self-control task that was either diagnostic or not diagnostic of social skills. The task they completed was the Stroop test, which is a color-reading test where individuals read the color ink in which words are written instead of the actual words. The printed words are color words whose semantic meaning distract from the ink color and make the test difficult. Finally, all participants were debriefed. Our findings supported our hypothesis. Among the rejected participants who believed the Stroop test diagnosed social skills, we found increased self-control and reduced negative affect. The findings have implications for understanding how we can help people cope with social rejection. Connecting social values to tasks that

may involve self-control may improve motivation and decrease self-control failure.

The Ties That Bind: How the Notion of Strategic Culture and Technological Advances Affect China and U.S. Perception
Aaron Sayama – Roosevelt at UGA
Dr. Seema Gahlaut, Center for International Trade & Security, University of Georgia

Strategy is the pervasive element within a nation's decisions; it is the motivating factor from domestic to foreign policy. One nation that takes the notion of strategy to the extreme is the People's Republic of China (PRC). For scholars and laymen, the PRC represents the ultimate enigma with regards to foreign policy and military doctrine—distilling some type of strategy remains elusive to policymakers. Yet, the world is beginning to notice the PRC's increase in investment in its military, and governments have started looking into possible reasons and outcomes for this seemingly sudden shift in Chinese military policy. Connecting political moves of other nations to broad strategic theory is one way scholars and policymakers address and identify problems in American foreign policy. My research attempts to connect defense acquisitions made by the PRC to strategic theory in an effort to improve American foreign policy regarding the PRC. Through a systematic exploration of the PRC's technology industry, paying special attention to their high-tech defense technology acquisitions, I attempt to present the explicit links between technology, security, and prestige in the PRC. I subsequently identify three major areas in which the PRC is competing with the U.S. Furthermore, I provide an analysis of their motivating factors and how current events fit under the PRC's strategic culture and discuss their political ramifications on global security.

Second Chances: Establishing an Administrative Expungement Procedure
John Seewoester – Roosevelt at UGA
Prof. Ed Risler, School of Social Work, University of Georgia

A Georgia Department of Corrections survey found that 36 percent of prisoners released from Georgia prisons in 2000 had reoffended within three years of their release. An analysis of relevant research suggests former criminals have difficulty obtaining gainful employment, accessing valuable state and federal welfare programs, and exercising their civil rights. In concert, these negative effects make it difficult for former criminals to reintegrate into society. Successful reintegration into society is critical to reducing former offenders' propensity to reoffend. This paper examines Georgia's current programs that encourage or facilitate reintegration and finds that the few programs that exist are insufficient because they lack clarity, simplicity, and ease of access. To address this insufficiency, this paper proposes that the Georgia State Legislature enacts an administrative expungement procedure that allows individuals convicted of certain crimes to clear their record if they complete a set of requirements designed to ensure rehabilitation. This paper examines the research supporting each of the proposed requirements and includes analysis of expected benefits and possible challenges associated with such a program.

The Significance of Spiritual Experience in Robert Penn Warren's Poetry
Matthew Sellers – CURO Summer Research Fellow, Roosevelt at UGA
Dr. Hugh Ruppersburg, Department of English, University of Georgia

Robert Penn Warren embarks on a spiritual journey beginning with his early poems and running through his later work, raising questions about the nature of transcendence, humanity's relationship with the natural world, and the impact personal, individual history (as opposed to a collective national identity) has on the individual. His journey culminates in *Altitudes and Extensions: Poems 1980-1984*, his crowning spiritual achievement. Though no critic has failed to note the spiritual side of Warren's work, few have treated the vacillation between the breathless anticipation of transcendental self-realization of poems like "Delusion—No!" and despondent crises of spiritual identity as in

"Covered Bridge," a defining characteristic of his last collection. This investigation probes the nuances of Warren's indecisive conclusions on the nature of spirituality and its relation to personal history and identity. Ultimately, the poet balances humanity's craving for spiritual fulfillment and surety against the weighty guilt of memory and conscience, the guilt "of forgetting the crime." An intense, incisive reading of his work illustrates that, in poetry, Warren recognizes his hopes and dreams alongside his failures and despairs; he grounds his outlook in human history, human intelligence, and human experience rather than divine beings or dogma. The iterative return to faith from its utter rejection marks the path by which Warren finds understanding. More importantly, doubt represents one of the ways Warren realizes identity. By considering the weight of past experiences and spiritual isolation, Warren suggests the necessity of spiritual transcendence to a meaningful quest for self-actualization.

Here and Queer: Creating Equal Protection for LGBTQ Students in Georgia Public High Schools

Matthew Sellers – CURO Summer Research Fellow, Roosevelt at UGA
Dr. Robert Hill, Department of Lifelong Education, Administration & Policy, University of Georgia

Lesbian, gay, bisexual, transgender, and queer (LGBTQ) students face harassment and bullying on a daily basis. A study by the Gay, Lesbian, and Straight Education Network (GLSEN) found that 86.2 percent of LGBTQ students reported harassment in the past year. Using a review of the literature and policy statements, the current project investigates the extent to which LGBTQ students are affected by harassment and assesses methods to mitigate its negative effects. According to survey data collected by the GLSEN, students who report harassment and violence based on sexuality or gender identity experience decreased educational and psychological outcomes, including lower GPAs, increased absenteeism and attrition, diminished post-secondary aspirations, and heightened risk of drug abuse and suicide. Moreover, these students later grapple with depression and insecurity in their adult lives. Faculty and staff play a significant role in the perpetuation of this harassment as they often ignore instances of harassment and bullying that merit intervention. The paper proposes the creation of a task force aimed at educating faculty and staff state-wide to increase efficacy in palliating the negative effects of harassment and bullying, including absenteeism; schools with supportive faculty who regularly intervene demonstrate half as much absenteeism as schools without supportive faculty. In addition to educating school employees, the policy suggests adapting anti-harassment and anti-discrimination policies to include sexuality and gender identity specifically since comprehensive policies successfully lower mean victimization scores by 12.5 percent. The paper finally explores the benefits of such a policy based on the correlation between lowered discrimination, harassment, bullying, and victimization and improved educational and psychological outcomes for LGBTQ students.

Dialectic in Late Plato

Michael Slade – CURO Scholar, CURO Summer Research Fellow
Dr. Frank Harrison, Department of Philosophy, University of Georgia

Questions of unity and plurality dominate Plato's late works. Nowhere is this more prevalent than his literary trilogy, *Theaetetus*, *Sophist*, and *Statesman*. Famous for its procedural asides, ethical digressions, and metaphysical flourishes, the trilogy engages an unrivaled spectrum of topics. But what is it that unifies the incredible variation in this particular group of writings? Upon a careful reading of certain key passages in *The Republic* and the beginning of *Theaetetus*, it becomes evident that Plato intended the trilogy to serve as an introduction to the dialectical science. When this idea is grasped, the once seemingly haphazard construction of the dialogues begins to neatly fall into a structured discourse on dialectical praxis and method. A demonstration is offered of both the "upward" and "downward" paths of philosophical process, complete with a running

commentary on the proper logical procedure for arriving at sound conclusions. The views propounded in the trilogy do not, as so many scholars believe, refute Plato's earlier philosophical orientation. Instead, we see in Plato's late technical works a consummation of his middle period metaphysics, offered with subtlety and sophistication.

The Philosopher's Progress: Eros, Dialectic, and Reality in Plato
Michael Slade – CURO Scholar, CURO Summer Research Fellow
Dr. Frank Harrison, Department of Philosophy, University of Georgia

The goal of my Honors thesis is to integrate previous Platonic research in CURO courses with a deeper understanding of the metaphysical reality in which Plato perceives the human being and, in particular, the philosopher operating. The dialectical and erotic approaches to the highest reality (be it the Good, the Beautiful, the One, etc.) seem, however, to often be at odds with one another. Given the association of these two concepts with the very nature of the philosopher and their proximity to some of the most important passages within the Platonic corpus, their seeming inconsistency is troubling indeed. The discovery of this incongruity has spurred me in two, opposite directions in regards to Plato's writing. On the one hand, I am driven back to the old, Socratic questions: What is virtue and, more specifically, what is human virtue? Further, how is individual practice of virtue connected to and influenced by the political practice of virtue? On the other hand, I find myself reaching upward toward the newer, Academic issues: What are the fundamental constituents of reality? What role do the Forms play (if any)? And, finally, how do these highest metaphysical realities affect the human being as such? While the two sets questions initially appear quite distant from each other, upon reflection it becomes evident that the answers to both sets together form the "playing field" within which human affairs are conducted and the twin processes of dialectic and Eros function. The characterization of this space of activity and the reconciliation of it with the philosopher's mode of existence is the primary goal of my thesis work.

Awareness of Borderline Personality Disorder in a University Population
Laura Smart
Dr. Rich Suplita, Department of Psychology, University of Georgia

Borderline personality disorder (BPD) is a psychiatric diagnosis that features instability of affect, identity, and relationships. It is estimated that 1-2% of the population has BPD. People with BPD often harm themselves and/or complete suicide. Despite the deleterious effects the disorder has on individuals, very few people are aware of its symptoms, and no empirical studies have examined public awareness of the disorder. The current study sought to test the hypothesis that undergraduates would not be able to identify the symptoms of BPD in vignettes describing persons with mental illnesses. Participants were recruited from the research pool and presented with several vignettes, each describing a person with a different psychiatric disorder, and asked to indicate what diagnosis (if any) they would give the person described. Results showed that none of the participants surveyed was able to identify symptoms of BPD, whereas a majority of the participants were able to identify schizophrenia, bipolar disorder, depression, an eating disorder, and substance abuse. These data indicate that BPD is a less known and therefore less understood disorder among the general population. Because previous research indicates that awareness and education decrease stigma of mental illness, interventions are needed to educate the public on BPD.

The Long Road to Zero: U.S. Declaratory Policy and Nonproliferation
Patrick Smith – Roosevelt at UGA
Dr. Dmitriy Nikonov, Center for International Trade & Security, University of Georgia

Early in his term, President Obama made the elimination of all nuclear weapons worldwide a goal of his administration in a major speech in Prague. Rogue state nuclearization, the constant

specter of accidental launch, and the declining legitimacy of the Nuclear Non-Proliferation Treaty (NPT) make this issue of capital importance. Moreover, the upcoming 2009 Nuclear Posture Review and 2010 NPT review conference afford the President and other leaders the opportunity to fundamentally address this issue. If the United States is serious about averting a "nuclear tipping point," Obama must follow through on his promise to reduce the role of nuclear weapons in our national security strategy. This paper proposes that the United States pursue a critical confidence-building measure that shifts our declaratory policy to one stating that the sole purpose of nuclear weapons is to deter a nuclear attack on the U.S., its forces, and its allies. While there is some support in the international community for this policy change, few realize the extent to which this move would aid nonproliferation goals. An in-depth review of the current literature reveals a strong need for a change in U.S. nuclear weapons policy and indicates that a "no first use" policy will be beneficial. Jump starting the process of delegitimizing nuclear weapons will help strengthen the NPT regime, reduce incentives for nuclear proliferation, and foster greater international cooperation on solving this transnational problem.

Promoting Sharing of OSINT Analysis Between Expert Institutions and the Intelligence Community

Irena Stevens – Roosevelt at UGA
Dr. Loch Johnson, Department of International Affairs, University of Georgia

As technology and general education continue to improve, open source intelligence (OSINT) is the fastest spreading, but most underutilized, form of information by intelligence operatives. The collection and processing of OSINT will become an insurmountable problem for the intelligence community (IC) without a venue for accessing the expertise of the academic, corporate, and research institutions on a need or demand basis. Since most of the information available to the analyst dealing with foreign events is open source, further development of an effective method of analysis can dramatically improve the framework of fragmented intelligence by filling in gaps and creating links. Effective analysis of OSINT can move the IC toward a greater understanding of other parties, especially in individual motivations and in cultural knowledge. This framework provides a more complete database to be supplemented by other forms of intelligence, such as those collected by clandestine or satellite methods. Since the internet is the main source of the expanding supply of information, it should also be used to organize and funnel ideas between outside parties and the intelligence community through a database of personnel and relevant research. The willingness to process and share information is rewarded with a system of incentives designed to benefit the analyst through recognition, monetary, professional, intellectual, and psychological rewards. By establishing a database of expert personnel and enabling them to share ideas, the intelligence community and research institutions can gain mutual benefit in processing open source information.

Effects of Weighing Protocol on Corticosterone Concentrations in Leghorn Chickens

Claire Stice
Dr. Kristen Navara, Department of Poultry Science, University of Georgia

In the poultry industry, weighing protocols often involve carrying and weighing the birds by the feet or the wings. There has been very little research studying how such handling techniques can affect their stress levels. The purpose of our study was to determine which weighing methods caused the most significant stress response. We hypothesized that coddling would provoke a smaller physiological stress response compared to birds that are handled in a less gentle manner such as by the wings or feet. We tested this hypothesis in two stages. For the first, we tested whether handling by the feet for 5min provoked a larger physiological stress response than coddling for the same period of time. For stage two, we weighed birds using one of three weighing protocols using similar durations to those in industry: handling by feet, handling by

wings, and weighing upright using a new weighing apparatus. Corticosterone levels, the primary stress hormone in birds, were measured 1h after handling using a radioimmunoassay. During stage one, birds inverted during handling produced significantly more corticosterone compared to coddled birds. During stage two, although we expected birds coddled and weighed without any physical restraint to have the lowest level of corticosterone, we saw no significant difference between any of the handling groups, perhaps due to the short handling duration used during the second stage. The findings from this experiment can be applied directly to industry as well as offer new questions for research and understanding the domestic chicken's response to stress.

Best Practices in Graduated Driver's Licensing

Theodore Story – CURO Apprentice
Dr. Don Bower, Department of Child & Family Development, University of Georgia

Automobile crashes are the leading cause of teen morbidity and mortality in the U.S. In recent years, increasing numbers of states have implemented legislation referred to as Graduated Driver's Licensing (GDL) as one approach to address this problem. Although GDL policies have been refined over time, remaining differences in the regulations among states (and even among countries) provide a rich research opportunity for recommending promising practice in this policy arena. This study attempts to answer this question of which current and proposed GDL practices seem to be most effective, with effectiveness being measured as effecting lower teen crash rates. The researchers will conduct a qualitative assessment of recent empirical research, trend analyses, government agency reports, and literature reviews for consistent and predominant themes. These themes will then be compared to current driver's licensing policies in Georgia to identify areas of potential improvement. Variables such as age at licensure, length of learning periods, cost of licensing, passenger and night-driving restrictions, testing procedures, and sanctions for violations are predicted to correlate with the effectiveness of practices. Existing literature that assesses the effectiveness of these practices is being reviewed and analyzed to create a compendium of research-based policy recommendations. Interstate as well as international GDL comparisons will be conducted and summarized. The product of this review will be a summary of best practice recommendations for consideration by Georgia legislators and agency administrators.

Novel Synergistic Inhibitors of Methicillin-Resistant *Staphylococcus aureus* (MRSA)

John Taliaferro
Dr. Timothy Long, Department of Pharmaceutical & Biomedical Sciences, University of Georgia

Haloenol Lactones (HEL) are a known family of 5- or 6-membered compounds that have proven to act as suicide inhibitors of serine proteases, much like human neutrophil elastase (HNE), chymotrypsin, and trypsin. Knowing HEL's targets for inhibition, it is thought that it could also cause inhibition of the serine protease β-lactamase. β-lactamases are enzymes produced by bacteria that cleave the β-lactam rings of β-lactam antibiotics. MRSA, a known strain of *Staphylococcus aureus* resistant to broad-spectrum antibiotics, produces high levels of β-lactamase, allowing it to resist antibiotics like β-lactams. For HEL to achieve inhibition of the β-lactamase, it allows the lactone to be hydrolyzed by the target protease enzyme. This hydrolysis reveals the reactivity of the molecule by exposing the electrophilic species of the HEL for the alkylation of the enzyme. The hydrolysis causes an acyl transfer to the active site hydroxyl group which releases an α-haloketone electrophilic moiety that alkylates the accessible nucleophilic residues at the active site. To test for inhibition of β-lactamase, multiple analogs of HEL were created using essential amino acids and alkylation of the free amine on each amino acid with propargyl bromide. From there, the lactone was formed by halolactonization. These analogs were placed at several different concentrations with a specific concentration of penicillin G and MRSA. One of the analogs showed zones of growth inhibition of the

MRSA, which grew larger as the concentration of the HEL increased. These increasing zones of inhibition showed that HEL has possible β-lactamase inhibition capabilities, and further analogs need to be created in order to test possible theories to why synergistic activity is observed.

DNA Methylation Related to Cancer
Yu Taniguchi – CURO Scholar
Dr. Shaying Zhao, Department of Biochemistry & Molecular Biology, University of Georgia

Xiao (~30kb) and Da (~280kb), meaning small and big, respectively, in Chinese, are regions found in the human genome. Since there has been no recombination between Xiao/Da sequences, we believed these regions are condensed, thereby preventing genomic rearrangement. Condensation of chromatin is usually directed by DNA methylation. Therefore, we believe that DNA methylation plays a key role in regulating these elements and preserving genome in these regions. To elucidate the key mechanism of heterochromatin formation in Xiao/Da and its effect, we have studied differences between methylated and unmethylated sequences by using Methylation-specific polymerase chain reaction (MSP). MSP allows us to differentiate methylated from unmethylated cytosine by using sodium bisulfite treatment of DNA that keeps the marks of methylated cytosines together with the specific amplification of this modified DNA utilizing primer sets that are only complimentary to the formerly methylated or unmethylated alleles. In order to perform MSP, I modified a wild type sequence of Xiao/Da into methylated and unmethylated sequences; designed wild-type, methylated, and unmethylated primers with UCSC genome browser and Primer 3 website; tested these primers with Bisulfite modified DNA in PCR; and ran agarose gel for a detection. We have expected to obtain results that show a strong methylation band and a weak unmethylated band. This may indicate that DNA methylation occurs in Xiao/Da regions and prove our hypothesis that DNA methylation causes condensation. DNA methylation would eventually contribute to preserving the human genome by avoiding any recombination between Xiao/Da sequences.

Breaking the Rules: A Qualitative Study of Academic Dishonesty at the University of Georgia
Michael Thomas – CURO Scholar
Dr. Mark Cooney, Department of Sociology, University of Georgia

Academic dishonesty is a frequently practiced behavior amongst students at the University of Georgia. Not to be confused with "cheating," a more vague term, academic dishonesty refers to any violation of a university honesty policy. Most academic dishonesty research predominately consists of extensive quantitative data gathered from a large number of universities. However, the literature lacks detailed accounts of the conditions preceding, during, and resulting from acts of academic dishonesty. By conducting extensive qualitative interviews with 17 University of Georgia Honors Program students and constructing a detailed database of their responses, my purpose was to discover what circumstances result in incidents of academic dishonesty, what sanctions are imposed on students found in violation of the University of Georgia academic honesty policy, and what preventive measures can be introduced to limit the frequency of academic dishonesty. Data revealed that despite the University's firm stance against violations of the academic honesty policy, students were exposed to numerous situations where acts of academic dishonesty could be easily commissioned. Interestingly, among the few students whom faculty detected for violations of the academic honesty policy, the vast majority were not reported to the University of Georgia administration but instead received informal sanctions. Though limited by a small sample size, these initial findings suggest that while still holding students accountable for academic honesty policy violations, faculty and administrators could introduce several simple strategies that would likely reduce the amount of academic dishonesty at the University of Georgia.

Application of Protein Interface Footprinting via Hydroxyl Radical Oxidation to Endopolygalacturonase II

Stephen Thompson
Dr. Robert Woods, Complex Carbohydrate Research Center, University of Georgia

Aspergillus niger is a fungus, commonly known as black mold, that secretes an enzyme, endopolygalacturonase II (PGII), that degrades the smooth regions of pectin in the cell walls of plants. PGII binds to the substrate polygalacturonic acid (PGA), a major substituent of pectin, and cleaves the internal bonds of homogalacturonan, which allows for the fragmentation and solubilization of pectin. To fully understand the function of PGII and the nature of its interaction with PGA, the location and function of the protein's active/binding site must be determined. Biomolecular surface mapping via hydroxyl radical footprinting offers an accurate method for the characterization of this interaction. Hydroxyl radicals, generated by nanosecond laser-induced photochemical dissociation of hydrogen peroxide, oxidize amino acid residues located on the protein surface to produce stable covalent modifications. When the ligand, PGA, is present on PGII, oxidation will occur on the amino acids not attached to the ligand. After protealitic digestion of the oxidized PGII via V8 protease, FT-LTQ mass spectrometry and ByOnic analysis software will be used to identify the non-oxidized fragments, which represent the active site of the protein. Comparison with solvent accessible surface area data will allow for the accurate development of a 3D structure for PGII, particularly the structure of its active site.

NCAMP-1: A Novel Host Danger Molecule in Catfish

Emilia Tuck
Dr. Liliana Jaso-Friendmann, Department of Infectious Diseases, University of Georgia

Host danger molecules are intracellular molecules that initiate inflammation when released into extracellular milieu upon tissue damage following trauma or infection. The innate immune response that ensues from the binding of these molecules to pattern recognition receptors (PRR) results in an increase in pro-inflammatory cytokine secretion and an increase in antigen presentation to adaptive immune cells. Danger molecules from microbial sources (e.g., LPS) and the mechanisms by which they induce inflammation are well understood, but less is known about their endogenous counterparts. Recent data from our laboratory have shown that a histone H1x-like protein, NCAMP-1, is released into serum of stressed animals and may induce activation of innate immunity in fish. Based on these findings, we hypothesize that NCAMP-1 may act as a host danger molecule. The objectives of this study are to assess changes in pro-inflammatory cytokine TNF alpha, IL-1 beta, and gamma interferon gene expression in catfish immune cells by quantitative polymerase chain reaction (qPCR). A time-dependent response in transcriptional activation of the genes of interest is measured following treatment of purified cells with recombinant NCAMP-1. The results demonstrate an increase in IL-1 beta message expression at 3 and 6 hours post-treatment. This information will provide knowledge about mechanisms by which the immune system may use self molecules to sense danger and produce inflammatory responses. Beyond the practical applications in the design of aquaculture vaccines, this work could also answer fundamental questions about chronic inflammation and autoimmune diseases in other species.

Glutamate Dehydrogenase and Its Role in *Helicobacter pylori*

Soumya Vaish
Dr. Robert Maier, Department of Microbiology, University of Georgia

The function of the enzyme glutamate dehydrogenase (GDH-ase), encoded by the gene gdhA, has not been studied in *Helicobacter pylori* bacteria. In *E. coli*, this enzyme catalyzes the formation of glutamate from α-ketoglutarate and thus assimilates nitrogen in the form of ammonia. Urease, another enzyme in *H. pylori*, forms ammonia from urea. We hypothesize that without the presence of GDH-ase, urease

activity may be decreased. As glutamate would not be produced, mutants may require a glutamate supplement to survive. Also, additional stress may cause lower growth rates and greater sensitivity to acidic pH. The wild-type strain, *H. pylori* 43504, and a constructed mutant strain lacking gdhA were both subjected to different growth conditions, including glutamate-supplemented blood agar media, Brain-Heart Infusion (BHI) media, and different levels of pH. Urease enzyme activity was also measured in both strains of bacteria. Our results did not support our hypothesis, as the growth rate, acid sensitivity, and urease activity of the mutant strain did not show any significant deviation from the wild-type strain. The construct was also able to grow on blood agar plates without supplemental glutamate. The survival of the mutant strain on blood agar suggests that there may be another pathway responsible for the synthesis of glutamate. This research broadens our knowledge of this common pathogen by drawing conclusions about the basic metabolic processes in *H. pylori*. Future experiments may involve comparing the two pathways of glutamate synthesis or conducting an assay measuring glutamate dehydrogenase specific activity.

Brain Activity Analysis of Good and Poor Performers During Inhibitory Eye Movements

Manouela Valtcheva – CURO Scholar
Dr. Jennifer McDowell, Department of Psychology, University of Georgia

Previous studies of eye movement performance in people with schizophrenia show that they make more errors than control subjects during tasks that require inhibition. One such task is the antisaccade task, which requires the subject to inhibit looking at a peripheral target and, instead, to generate a saccade (quick eye movement) to the mirror image location of the stimulus. Imaging studies in our lab and others have indicated that during the antisaccade task, people with schizophrenia exhibit decreased activity in prefrontal cortex and related circuitry. Such dysfunction in prefrontal cortex seems to be associated with poor performance on tasks requiring inhibition and working memory generally, not just among those with schizophrenia. The current study looks at differences in brain activity between undergraduate students selected for good and poor performance on the antisaccade task. It is hypothesized that there will be decreased prefrontal cortex signaling associated with poor antisaccade performance. The subjects were placed in a 1.5 T MR scanner while performing antisaccade tasks. Functional MRI data were obtained for 30 subjects (69% female, M = 19.6 (SD = 2.1) years, 100% right handed), representing the top and bottom third of an antisaccade proportion correct distribution (N = 114). The functional MRI data will be analyzed to evaluate activity differences in prefrontal cortex and other regions between groups of good and poor performing subjects.

Synthesis of a Robust Photoremovable Protecting Group for Photoactivation of Gene Expression

Alexandra Walker – CURO Summer Research Fellow
Dr. Timothy Dore, Department of Chemistry, University of Georgia

Photoactivation of gene expression is an invaluable technology that enables the study of intracellular physiology. Genes important to tissue development often have different functions at different stages of life. Utilizing two-photon excitation (2PE) allows for excellent spatiotemporal control of gene expression and is useful for the investigation of tissue-specific roles of developmental genes. A photoactivatable activator of gene expression based on the 8-bromo-7-hydroxyquinolinyl (BHQ) and the 6-bromo-7-hydroxycoumarin (Bhc) groups will be synthesized and tested for its photochemical properties. BHQ and Bhc are photoremovable protecting groups that are hydrolytically robust and sensitive to 2PE. They will be conjugated to a small molecule that induces expression of a developmental gene of interest. Release of this regulator through exposure to 2PE light will trigger the expression of a gene in a single cell at developmentally critical times. Significant progress toward

synthesis of the targets has been made, but the reactions have not been optimized to adequately produce the desired products. Bromide groups were effectively appended to BHQ and Bhc, but their subsequent replacement by dimethyldithiocarbamate groups was achieved for Bhc and not BHQ. Reduction of the dimethyldithiocarbamate groups to sulfides on Bhc was not accomplished without destruction of the coumarin ring, which is less robust than quinoline. Low-yielding steps early in the synthesis reduce the availability of materials for experimental reactions on the forefront. Theoretically, each step of the syntheses is possible to enact, but alterations should be made to the procedures and workups of each reaction to obtain the desired product.

Involvement of DNA Damage Response Factors in the Proliferation of Cancer Cells

Alice Weaver
Dr. Michael Terns, Department of Biochemistry & Molecular Biology, University of Georgia

Telomeres, protective segments of non-coding DNA at the ends of eukaryotic chromosomes, play important roles in aging and cancer. Telomerase is the enzyme that synthesizes telomeres, a process occurring early in human development. The absence of telomerase activity in adults results in gradual telomere shortening, which triggers cell senescence or apoptosis. In most cancers, telomerase reactivation renders cells immortal, allowing for continued proliferation. Thus, telomerase is a molecular target for halting cancer growth. To better understand how telomerase works, our lab has developed a fluorescence *in situ* hybridization (FISH) procedure to view the subcellular localization of telomerase in human cancer cells. Results indicate that telomerase is only recruited to a fraction of chromosomes during each round of telomere synthesis. Based on previous evidence, we hypothesize that the subset of chromosomes acted upon by telomerase may be the same subset where DNA damage response (DDR) factors are observed. We are performing two experiments in HeLa cancer cells to evaluate our hypothesis: a) FISH and immunofluorescence to test for the co-localization of DDR proteins and telomerase and b) protein knockdown and FISH to examine telomerase recruitment in cells where DDR is blocked. Our hypothesis predicts a positive correlation between telomerase recruitment and DDR proteins, which would suggest that DDR factors may be involved in telomere elongation and suggest directions for further cancer research.

Development of Consensus-Degenerate Hybrid Oligonucleotide Primers for Retroviral Discovery

Shuyan Wei – CURO Summer Research Fellow
Dr. Scott Schatzberg, Department of Small Animal Medicine, University of Georgia

Identification of infectious etiologies for diseases is necessary to allow appropriate diagnosis, treatment, and prevention of disease. Retroviruses are a common cause of disease, but currently available methodologies for identification of unknown retroviruses are time-consuming. The objective of this study was to develop a polymerase chain reaction (PCR) assay using consensus-degenerate hybrid oligonucleotide primers (CODEHOPs) for efficient identification of known and novel retroviruses. Using the CODEHOP strategy, two sets of PCR primers were manually developed based on published amino acid and nucleotide sequences of the polymerase gene from 57 retroviruses. The primers were designed to contain a 3' degenerate core, based on 3-4 highly conserved amino acids, and a 5' consensus clamp, based on the most common codon used for 6-8 amino acids upstream of the degenerate core. To evaluate one set of primers, reverse-transcriptase PCR was performed on nucleic acids extracted from reticuloendotheliosis virus, lymphoproliferative disease virus of turkeys, and feline leukemia virus. Amplicons of the expected size for all three viruses were visualized following electrophoresis and exposure to ultraviolet light. The results suggest the developed primers are able to recognize multiple retroviruses with one PCR assay as expected. In the future, both sets of primers will be tested on representative retroviruses from each retroviral family.

Specificity will be evaluated by sequencing of the PCR amplicons, and serial dilutions will be used to evaluate sensitivity. Ultimately, the primers will be applied to clinical cases of canine neurological disease where retroviruses are expected to play a role in pathogenesis.

Great Powers and Grand Strategy on the Korean Peninsula: The Gap Between Rhetoric and Action

Edward Wells – CURO Apprentice
Dr. Brock Tessman, Department of International Affairs, University of Georgia

The current diplomatic gridlock and nuclear standoff on the Korean peninsula is a product of the manner in which the six key actors in the region—China, Japan, Russia, the United States, South Korea, and North Korea—define their national interest. All of the states involved, except for North Korea, have publicly claimed to support non-proliferation and the reunification of the North and the South. Yet, their actions sometimes suggest other motivations. Though the public intent of key actors is to promote peace and principles, negotiating tactics and foreign policy behavior indicate an emphasis on power and prosperity. This difference between rhetoric and action has led to a lack of progress in achieving the set goals of non-proliferation and reunification. This paper acknowledges that states conceive their national interests based on the framework of the "4Ps"—power, peace, prosperity, and principles. Each actor claims peace and principles to be the top priority in promoting a unified and nuclear-free Korea, but power and prosperity tend to dominate the actual foreign policy agendas of these states. This argument is supported by the empirical record: after over a half-century of negotiations, conflicts, and compromises, the six parties have yet to resolve either the North Korean nuclear issue or the related challenge of reunification.

Heart Rate Plateau in Response to Exercise Follows Exponential Kinetics

Benjamin Wheeler & Destinee Ingrao
Dr. James Hargrove, Department of Foods & Nutrition, University of Georgia

The plateau principle postulates that health related transitions follow simple exponential kinetics. We tested the idea that change in heart rate during a timed step test could be modeled as an exponential function. The mathematical model is equation 1, where Mt is the value of a dependent variable such as pulse rate at time t, M0 is the initial value, Mss is the asymptote at the new steady state, and k is the first order rate parameter:

$$Mt = M0 + (Mss - M0)*(1- e\text{-}kt)$$

Subjects were 4 male and 27 female UGA students who were in good health. Data were collected with an Omron model HR-100C heart rate monitor. Each subject recorded heart rate at one-minute intervals while sitting, standing, and stepping up and down from an 18 cm step at a rate of 30 steps per minute. They sat down immediately after 3 min of stepping and recorded their pulse rates for another 3 min. Equation 1 was fit to individual and group average data using Solver in Microsoft Excel®. The rate parameter for approach to plateau in heart rate during the step test was 1.8 per min, and the plateau was 118 bpm. During recovery, the value of k was 1.5 per min, and the resting plateau was 75 bpm. We will present data showing that the equation can forecast changes in heart rate, namely, a reduction in mean heart rate and blood pressure, in response to short- and long-term training.

Habitats of West Nile Virus Competent Mosquitoes: The Effects of Urbanization in New York City

Abby Wong – CURO Scholar
Dr. John Drake, Odum School of Ecology, University of Georgia

West Nile virus (WNV), a flavivirus spread by mosquitoes, first appeared in the United States in 1999. Since then, more than 25,000 people have been infected, resulting in over 1,000 fatalities. Mosquito habitat modeling has become one of the primary methods for predicting WNV incidence in human populations. As part of an ongoing partnership between the University of Georgia's Odum School of Ecology and the New York State Department of Health and Mental Hygiene

(DOHMH) to examine the dynamics of vector-borne diseases in urban environments, a study was undertaken to understand distribution of WNV competent mosquito species. Results of a systematic review of the relevant literature showed that at the spatial scale of a city, competent mosquito species are rarely found in areas that have the highest percentage of impervious surfaces, but they are associated with moderate levels of development (e.g., areas with mild vegetation, medium population density, and artificial water sources, such as sewer treatment facilities or detention ponds). Therefore, machine learning algorithms were used to identify patterns in the relationship between mosquito species distribution and environmental variables associated with moderate levels of urbanization and postulated to influence local mosquito abundance. The results of these models will be mapped in New York City to identify hotspots of mosquito aggregation that may be targeted by DOHMH for mosquito control and thereby limit the transmission of WNV to human populations.

The Effect of Online Communication and Social Support on Positive Emotion and Health Outcomes in Individuals Treated with Ileoanal Reservoir Surgery

Sook Kyung Yoon – CURO Scholar
Dr. Kimberly Clay, School of Social Work, University of Georgia

This study will examine the use of the internet blog *jpouch.net* as a mechanism for the communication of positive emotional expression in survivors of chronic ulcerative colitis, colon cancer, and familial polyposis. The purpose of the study will be to measure the efficacy of this particular intervention method to promote positive mental health outcomes. Positive emotional expression is operationally defined using Fredrickson's Broaden and Build Theory of Positive Emotion in a mixed methods study based on survey data and messages from active participants in this online support group. The aim of this project is to establish the benefits of positive emotions and how these emotions are mediated and translated through the internet blog medium. The messages posted to the blog will be analyzed using content analysis. Statements will be coded via manifest and latent content, in which the explicit and implicit messages will be extracted and evaluated within the context of how they affect treatment outcomes. Data will be analyzed using qualitative analysis software NVivo and quantitative analysis software Linguistic Inquiry and Word Count. Survey data will also be assessed for statistical significance in SPSS. As results are compiled researchers will extract pertinent content and interpret its potential meaning and implications for the population being studied. The research will be conducted collaboratively with students and faculty from several different departments, including social work, communications, biochemistry, and textiles.

Creation of a Reporter Molecule That Will Identify the Pathway Used to Degrade Isoprenylated Molecules

Laura Zeidan
Dr. Walter Schmidt, Department of Biochemistry & Molecular Biology, University of Georgia

Over the past decades, the function and existence of protein modification has been vague, but in recent decades the standard pathway of protein synthesis has been revised to include a final step, the posttranslational modification of proteins. Posttranslational modification can be followed by a reporter molecule, such as a plasmid. It has been observed that reporter molecules have altered steady states when not properly modified. The Schmidt lab has observed that cells recognize isoprenylated intermediates, proteins with additive hydrophobic molecules, and target them for protein turnover. We are concerned in this study with the fate of the intermediates of isoprenylated molecules when the Caax motif (prenylation, AAX tripeptide proteolysis, and carboxylmethylation) is improperly modified by proteolysis and/or carboxylmethylation. It was my aim to create a plasmid that allows me to identify the pathway used to degrade isoprenylated molecules. The knowledge of degradation mechanisms could lead to potential

discoveries of methods in which protein turnover can be regulated with therapeutic goals. The oncoprotein Ras is an isoprenylated and therapeutic target. Chemical agents that interfere with Ras Caax proteolysis and/or carboxylmethylation are in development and could be coupled with strategies to enhance turnover in order to deplete cancer cells of the Ras oncoprotein. Using PCR amplification, restriction digest, and ligations, a plasmid containing similar features to a-factor, the yeast mating pheromone, was created. The eventual goal is to use the plasmid that I created to reason the impact of inappropriate Caax modification on protein steady state levels.

THE UNIVERSITY OF GEORGIA
CENTER FOR UNDERGRADUATE RESEARCH OPPORTUNITIES

2011

CURO

Symposium

Program and Abstracts

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Table of Contents

CURO 2012 Symposium Call for Abstracts

The annual CURO Symposium provides a forum for undergraduates from all disciplines to present original research and creative works sponsored by faculty members. The Symposium highlights excellence in undergraduate researcher in the state of Georgia and promotes communication and cooperation between faculty and students.

Undergraduate researchers from all public and private higher education institutions in Georgia, and at various stages of the research process, are encouraged to submit abstracts for presentation.

Students may choose to present in one or more of the following formats: Oral, Poster or Thesis Roundtable.

Papers on work being presented at the CURO Symposium submitted by February 21, 2012* will be considered for **Best Paper Awards** in the categories of arts, biological sciences, civic responsibility focus, humanities, international focus, physical sciences and social sciences. Maximum length is 12 pages, double spaced, excluding references and appendices.

Abstract Criteria:

- **Abstract must be no more than 250 words and free of spelling and grammatical errors.**
- Abstracts must contain a thesis or problem statement, description of methods, statement of anticipated findings and a statement of the significance of the research. Abstract must represent ethical and responsible research.
- Abstracts must accurately reflect the extent of the undergraduate student's involvement in development of the research design and execution of the project. Research presented at the Symposium should go beyond work completed for a class paper or project.
- Abstract must be accompanied by a letter of support from the supervising faculty mentor **from the presenter's home institution.**

Submission Process:

- Undergraduates should submit an abstract on-line no later than midnight **January 27, 2012***. **Only abstracts limited to 250 words and free of spelling and grammatical errors will be accepted. Abstracts that do not adhere to stated criteria will not be considered.**
- The sponsoring faculty member must submit a brief supporting letter on-line by midnight **February 3, 2012***. The letter denotes the faculty member's support of the research abstract being published in the Book of Abstracts.
- Group research projects should be submitted with one application and one letter of faculty support.
- All abstracts will receive graduate student review and feedback.
- **Accepted participants will be notified by February 17, 2012***, and their abstracts will be published in the CURO 2012 Symposium Book of Abstracts.

* All dates are subject to change as dictated by the academic calendar.

The annual CURO Symposium is free and open to the public, and all interested faculty and students are encouraged to attend. For more information, contact Center for Undergraduate Research Opportunities at curo@uga.edu or (706) 542-5871

JURO@GA THE UNIVERSITY OF GEORGIA'S JOURNAL FOR UNDERGRADUATE RESEARCH OPPORTUNITIES

CALL FOR SUBMISSIONS

The Journal for Undergraduate Research Opportunities publishes original research papers in the areas of humanities, social sciences, and policy as well as art-related content. **You must present your work at the annual CURO Symposium to be eligible for publication**. Submissions are accepted throughout spring semester at http://www.uga.edu/juro/.

The following general format should be adhered to as closely as possible. The cover page should include the student researcher's name, major, year of anticipated graduation, faculty advisor's name, and institution attended. This information should be followed immediately by the abstract. The research article itself may be organized into the following sections: introduction, methods, findings, conclusion, and references.

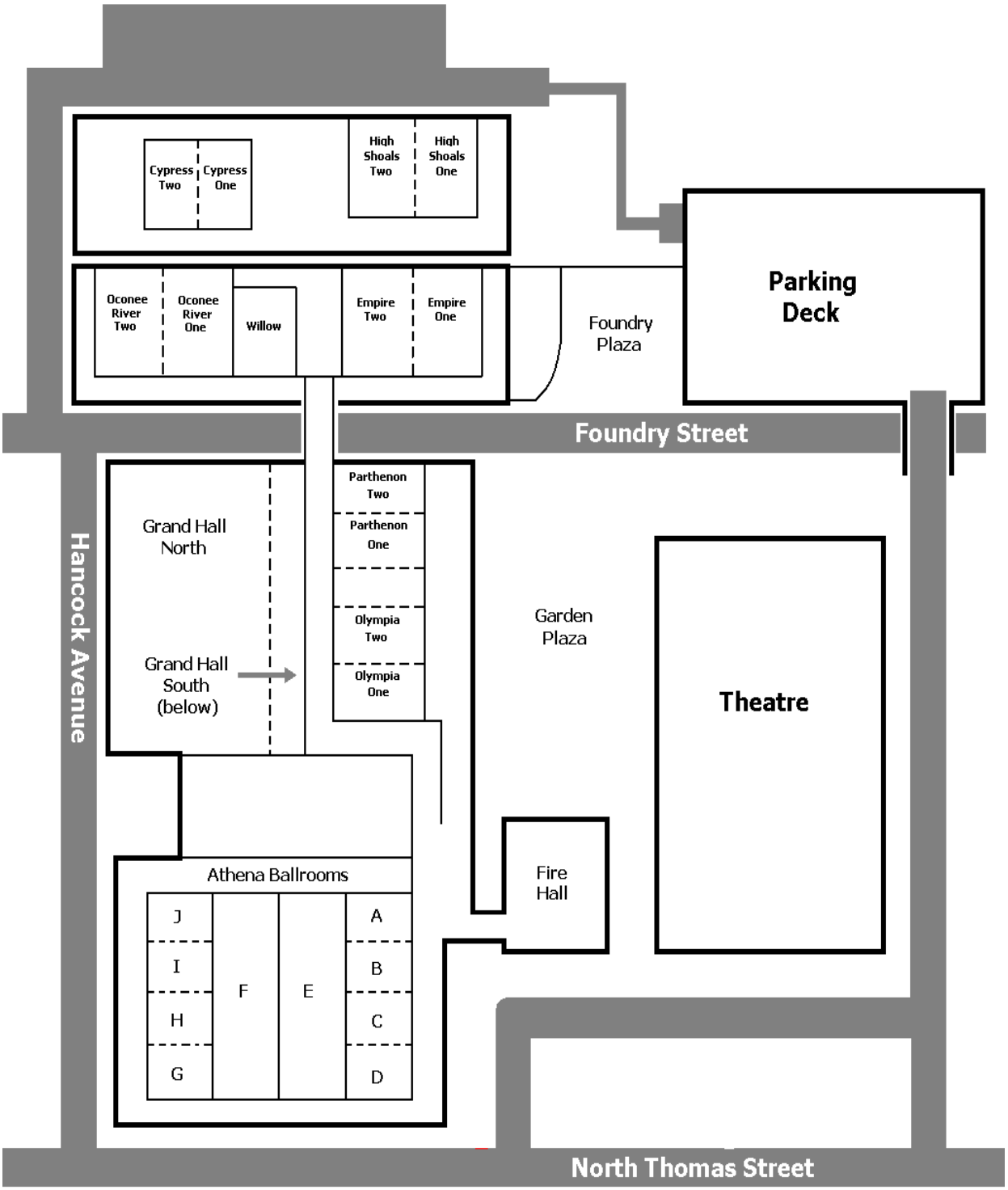
Additionally, work submitted to JURO@GA must adhere to the following guidelines:

1. Maximum length is 30 pages, double-spaced. Theses can be shortened to comprise the central idea of the research in order to be eligible for publication in the journal.
2. All submissions are submitted in English unless other arrangements are made.
3. All work must be submitted with an abstract no longer than 250 words. The abstract should provide a background sufficient to establish a context for understanding the research, summarize the research article itself, and highlight the major results.
4. References should be organized according to the standard format for the individual discipline the research topic falls under, e.g. Modern Language Association, Council of Biology Editors, American Psychological Association, or Chicago style format.
5. Work must be fully represented in digital form (preferably a Microsoft Word document for papers) and emailed to juro@uga.edu.
6. All submissions must be accompanied by a completed Submission and Faculty Advisor Approval Form found on the website at http://www.uga.edu/juro/.

Submissions will be evaluated according to criteria established by the editorial staff of the journal. Incoming research will be reviewed first by JURO@GA's content editors and other staff members. Prospective publications are subject to the approval of the journal's Editor-in-Chief. Upon completion of the review, the author may expect to receive either a notification of acceptance, acceptance with revisions, or a rejection of submission. Any questions about the submission process or the journal itself should be directed to juro@uga.edu. JURO@GA wishes you the best of luck with your CURO Symposium presentation and looks forward to reviewing the finished product of your hard work.

Contact JURO at JURO@uga.edu or visit our website at http://www.uga.edu/juro/

Classic Center Facility Layout



Monday, April 4, 2011

Begin registration of presenters; students hang up posters **8:30 a.m.**
Classic Center, Lobby

Concurrent Oral Sessions **10:10 a.m.**
Classic Center, Athena Breakout Rooms A, B, C, D, G, H, J

Thesis Roundtable Session **10:10 a.m.**
Classic Center, Parthenon Room

Concurrent Oral Sessions **11:15 a.m.**
Classic Center, Athena Breakout Rooms A, B, C, D, G, H, J

Thesis Roundtable Session **11:15 a.m.**
Classic Center, Parthenon Room

Concurrent Oral Sessions **12:20 p.m.**
Classic Center, Athena Breakout Rooms A, B, C, D, G, H, J

Concurrent Oral Sessions **1:25 p.m.**
Classic Center, Athena Breakout Rooms A, B, D, G, H, J

Concurrent Oral Sessions **2:30 p.m.**
Classic Center, Athena Breakout Rooms A, B, C, D, G, H, J

General Session **4:00 p.m.**
Classic Center, Athena Ballroom E **Dr. David S. Williams**
Associate Provost and Director, Honors Program

Remarks **Professor Jere W. Morehead**
Senior Vice President for Academic Affairs and Provost

Excellence in Undergraduate Research Mentoring Awards **Dr. David C. Lee**
Vice President for Research

Best Paper and UGA Libraries Research Awards **Dr. Laura Jolly**
Vice President for Instruction
Ms. Deborah Dietzler
Executive Director, Alumni Association
Ms. Caroline Barratt
Director, Miller Learning Center Library Commons

Introduction of Keynote Speaker **Ms. Sheena Zhang**
Foundation Fellow ’11, Ecology, Biology
and Sustainable Design in the Built Environment

Keynote Address: *Doing Science in the Face of a National Emergency* **Dr. Samantha Joye**
Professor, Department of Marine Sciences
Director, Center for Integrative Conservation Research

Poster Session, Science as Art & Reception **5:00 p.m.**
Classic Center, Grand Hall South (downstairs)

Monday, April 4, 2011

Concurrent Oral Sessions

Classic Center, Athena Breakout Rooms A, B, C, D, G, H, J

10:10 – 11:00 a.m. First Concurrent Session

Room A	**JoyEllen Freeman**	The Message Behind the Music: Blind Tom's Response to Nineteenth Century Views on Race
	Faculty Mentor	Dr. Barbara McCaskill, Department of English
	Isha Ghodke	Representations of Children and Childhood in Jurek Becker's Holocaust Novel *Jakob der Lügner*
	Faculty Mentor	Dr. Martin Kagel, Department of Germanic & Slavic Studies
	C.T. Bailey	Kanji and the A-curve
	Faculty Mentor	Dr. William Kretzschmar, Department of English
Room B	**Rachel Perez**	Oil Palm Proliferation in Latin America
	Faculty Mentor	Dr. J. Peter Brosius, Department of Anthropology
	Hank Schwartz	Reducing Water Usage by Repowering Plants in Georgia
	Faculty Mentor	Dr. Laurie Fowler, Odum School of Ecology
Room C	**Abby Wong**	Increasing Enrollment of Eligible Children in Georgia's Medicaid and CHIP Programs
	Faculty Mentor	Dr. Angela Fertig, Department of Public Administration & Policy
	Tiffany Hu	Mandating a Federal Excise Tax on Caloric Sweetened Beverages in the U.S.
	Faculty Mentor	Dr. Angela Fertig, Department of Public Administration & Policy
	Ammarah Mahmud	Revisiting U.S. Procurement of Non-Emergency Food Aid
	Faculty Mentor	Dr. Maria Navarro, Department of Agricultural Leadership, Education & Communication
Room D	**Pranav Kaushish**	Y-Linked Variation and Senescence in *Drosophila melanogaster*: Starvation Resistance
	Faculty Mentor	Dr. Daniel Promislow, Department of Genetics
	Michael Bray	Genetic Analysis of Pigmentation in *Drosophila tenebrosa*
	Faculty Mentor	Dr. Kelly Dyer, Department of Genetics
	Krelin Naidu	Epigenetic Effects of Bromate on p21 and Histone-2AX Expression in HEK293 Cells
	Faculty Mentor	Dr. Brian Cummings, Department of Pharmaceutical & Biomedical Sciences

Room G	**Ashley Bartlett**	The Elements of Chinese Grand Strategy: Applying a New Analytical Approach
	Faculty Mentor	Dr. Brock Tessman, Department of International Affairs
	Chad Peltier	Cognitive X's and O's: First Steps in the Resolution to the Offensive-Defensive Realist Debate
	Faculty Mentor	Dr. Jeff Berejikian, Department of International Affairs
	Edward Wells, Jr.	Grand Strategy as it Pertains to the Korean Peninsula
	Faculty Mentor	Dr. Brock Tessman, Department of International Affairs
Room H	**Tony Pelli, Katherine Arnold, Yuliya Bila, Rohan Mukhopadhyay, Shyam Shanker, Patrick Smith, Seth Taylor**	Battling With Bytes: A Cybersecurity Doctrine for the United States
	Faculty Mentor	Dr. Dan Everett, Department of Computer Science
	Lauren Howard	Thwarting Radiological Terrorism: Policies for Regulating the Security of High-Risk Radioactive Sources
	Faculty Mentor	Dr. Dmitriy Nikonov, Center for International Trade & Security
	Archil Japardize	Security Contractors: The Future of Peacekeeping?
	Faculty Mentor	Dr. Fred Manget, School of Law
Room J	**Daniel Cellucci**	First-Principles Investigations of Oxygen Vacancies on SnO2 Nanofilms
	Faculty Mentor	Dr. Steven Lewis, Department of Physics & Astronomy
	Whitney Ingram	Surface Plasmon Resonance Enhancement by an Electrostatic Sampling Device
	Faculty Mentor	Dr. Yiping Zhao, Department of Physics & Astronomy

10:10 – 11:00 a.m. First Thesis Roundtable Session

Classic Center, Parthenon Room

Table 1	**Tatum Mortimer**	Epidemiology of Equine *Staphylococcus aureus* in Georgia and Kentucky from 1995-2003
	Faculty Mentor	Dr. Susan Sanchez, College of Veterinary Medicine
	Muktha Natrajan	The Effects of Manganese on Human Neural Stem Cell Cultures
	Faculty Mentor	Dr. Steven Stice, Department of Animal & Dairy Science
	Malavika Rajeev	The Effect of Parasite Infection on Monarch Butterfly Mating Behavior
	Faculty Mentor	Dr. Sonia Altizer, Odum School of Ecology

	Anna White	Clinico-pathological Characterization of Newly Isolated Newcastle Disease Viruses from Dominican Republic, Belize and Peru
	Faculty Mentor	Dr. Corrie Brown, College of Veterinary Medicine
Table 2	**Mary Burriss**	Characterization of *C. elegans* Insulin-degrading Enzyme
	Faculty Mentor	Dr. Walter Schmidt, Department of Biochemistry & Molecular Biology
	Edward Lilla	Rce1 Membrane Topology
	Faculty Mentor	Dr. Walter Schmidt, Department of Biochemistry & Molecular Biology
	Alexander Sevy	Ty1 Element Antisense RNA Activity from Natural Saccharomyces Isolates
	Faculty Mentors	Dr. David Garfinkel, Department of Biochemistry & Molecular Biology
Table 3	**Ryan Jordan**	Children's Directional Understanding of Arrows
	Faculty Mentor	Dr. Janet Frick, Department of Psychology
	Cody Nichol	Emotion Regulation in Children: Implications for Affect and Childhood Psychopathology
	Faculty Mentor	Dr. Cynthia Suveg, Department of Psychology
	Rebecca Parker	Evaluation on Blood Flow Velocity and Arterial Diameter Produced by Compression Therapy
	Faculty Mentor	Dr. Kevin McCully, Department of Kinesiology
	Sarah Thorne	The Effects of Lutein and Zeaxanthin Status and Macular Pigment Optical Density on Neural Efficiency
	Faculty Mentor	Dr. Lisa Renzi, Department of Psychology
Table 4	**Emily First**	Mineral Probes of Magmatic Processes at Valles Caldera, Northern New Mexico
	Faculty Mentor	Dr. Michael Roden, Department of Geology
	Anisha Hegde	The Boom That Saved the Day
	Faculty Mentor	Dr. Leara Rhodes, Grady College of Journalism &Mass Communications
	Sheena Zhang	An Analysis of Green Buildings: Comparing Tsinghua University's Sino-Italian Ecological and Energy-Efficient Building and UGA's Odum School of Ecology Building
	Faculty Mentor	Dr. Laurie Fowler, Odum School of Ecology

11:15 – 12:05 p.m. Second Concurrent Session

Classic Center, Athena Breakout Rooms A, B, C, D, G, H, J

Room A	**Malin Dartnell**	Where the Pavement Ends: An Evaluation of the Urban Heat Island Effect in Metropolitan Atlanta
	Faculty Mentor	Dr. Jenna Jambeck, Department of Biological & Agricultural Engineering
	Katherine Riccione, Ryan Boelter, Tina Carson, Chase Mooney	Design of a Computed Tomography Scanner with Components from an Existing DEXA Machine
	Faculty Mentor	Dr. Mark Haidekker, Department of Biological & Agricultural Engineering
	Pranay Udutha	Preserving Georgia's Waterways: Tackling Interbasin Transfer in Georgia
	Faculty Mentor	Dr. Laurie Fowler, Odum School of Ecology
Room B	**Katie Branscomb**	The Political Economy of the Textile Industry in Bangladesh
	Faculty Mentor	Dr. Santanu Chatterjee, Department of Economics
	Meredith Jones	Worse Before It Gets Better? Or Just Worse?
	Faculty Mentor	Dr. Santanu Chatterjee, Department of Economics
	Munir Winkel	Smart Moves: Avoiding Common Investing Mistakes
	Faculty Mentor	Dr. Swarn Chatterjee, Department of Housing & Consumer Economics
Room C	**Katherine Black**	Differences in Functional Movement Screen Scores Between Female Soccer Players That Were Injured vs. Uninjured
	Faculty Mentor	Dr. Cathleen Brown, Department of Kinesiology
	Jenny Brickman	Effects of Medial-Wedge Orthotics on Knee Frontal Plane Moments in Individuals with Valgus Knee Alignment and Lateral-Compartment Osteoarthritis
	Faculty Mentor	Dr. Cathleen Brown, Department of Kinesiology
Room D	**Ebony Caldwell**	Influences on the Outlook of the Post-college Educational Opportunities and Choices of Undergraduate Science Majors
	Faculty Mentors	Dr. Monica Gaughan, Department of Health Policy & Management
	Agni Chandora	U.S. Primary Care Physicians: A Dying Breed
	Faculty Mentor	Dr. Monica Gaughan, Department of Health Policy & Management
	Osama Hashmi	Creating the Physician of the Future: Addressing the Health Needs of Rural Georgia Communities
	Faculty Mentor	Dr. Monica Gaughan, Department of Health Policy & Management

Room G	**Anastasia Couvaras**	Perceived Barriers and Medication Adherence in Adolescents
	Faculty Mentor	Dr. Ronald Blount, Department of Psychology
	Hannah Machemehl	Developmental Changes in Human Infants' Strategies for Recognizing Human and Animal Faces
	Faculty Mentor	Dr. Janet Frick, Department of Psychology
	Cody Nichol	Emotion Regulation in Children: Implications for Affect and Childhood Psychopathology
	Faculty Mentor	Dr. Cynthia Suveg, Department of Psychology
Room H	**Vanessa Hanvey**	Spatial and Temporal Analysis of the Ceramics and Lithics at the Burnt Village, 9TP9
	Faculty Mentor	Dr. J. Mark Williams, Department of Anthropology
	Bryn Murphy	"Cuando uno toma el agua del Tambopata…": Migration and the Urban Environment in Madre de Diós, Peru
	Faculty Mentor	Dr. J. Peter Brosius, Department of Anthropology
	Rebecca Stein	How Leadership Makes a Difference: The Predictive Role of Managerial Leadership Competencies in a Multi-National Company
	Faculty Mentor	Dr. Karl Kuhnert, Department of Psychology
Room J	**Jessica Holmes**	Isolation and Characterization of Polyomavirus Middle T (PyVT) Mammary Cancer Stem/Progenitor Cells
	Faculty Mentor	Dr. Michael Pierce, Department of Biochemistry & Molecular Biology
	Rachel Johnson	*Plasmodium falciparum*: Expression of the DBL3x region of VAR2CSA
	Faculty Mentor	Dr. David Peterson, Department of Infectious Diseases
	Emily Peng	A Flow Cytometry-Based Method of Glycosylation Profiling
	Faculty Mentor	Dr. Robert Woods, Department of Biochemistry & Molecular Biology

11:15 – 12:05 p.m. Second Thesis Roundtable Session

Classic Center, Parthenon Room

Table 1	**Dillon Horne**	Symbolization and Religious Thought
	Faculty Mentor	Dr. Thomas Cerbu, Department of Comparative Literature
	Caleb Moreno	Orpheus in Opera
	Faculty Mentor	Dr. Dorothea Link, Hugh Hodgson School of Music
Table 2	**Ashley Bartlett**	Democracy Blinded: a Study of the Afghanistan and Iraq Wars, 2001-2008
	Faculty Mentor	Dr. John Morrow, Department of History

	James Herman	John Lloyd Stephens and Mesoamerican Orientalism
	Faculty Mentor	Dr. John Short, Department of History
	Justin Leef	Salient Issues as Forces for Change in the Peach State: Bioscience and Research Meet Deep South Politics
	Faculty Mentor	Dr. Charles Bullock, Department of Political Science
Table 3	**Anna Legostaev**	An Analysis of Two Great Russian Poets and a Discussion of their Ties to Russia's History and its People
	Faculty Mentor	Dr. Elena Krasnostchekova, Department of Germanic & Slavic Studies
	Matthew Sellers	Every Man a King: Robert Penn Warren, Populism and Contemporary American Politics
	Faculty Mentor	Dr. Hugh Ruppersburg, Department of English
	Laura Wynn	Representations of the East German Secret Police in Contemporary German Literature
	Faculty Mentor	Dr. Martin Kagel, Department of Germanic & Slavic Languages
Table 4	**Melissa Brown**	Black Stereotypes in Reality Television and the Reinforcement of Prejudiced Attitudes
	Faculty Mentor	Dr. Leonard Martin, Department of Psychology
	Ah Hyun Jun	Characterization of Disease Causing Mutations of hENT3
	Faculty Mentor	Dr. Rajgopal Govindarajan, Department of Pharmaceutical & Biomedical Sciences
	Trenton Mize	Legitimacy and Status in Mixed-Gender Task Groups
	Faculty Mentor	Dr. Dawn Robinson, Department of Sociology
	Raha Sabet	Attuning to Positive Social Cues as an Effortful Process for Socially Anxious Individuals
	Faculty Mentor	Dr. Michelle vanDellen, Department of Psychology

12:20 – 1:10 p.m. Third Concurrent Session

Classic Center, Athena Breakout Rooms A, B, C, D, G, H, J

Room A	**Joshua Barnett**	Tri-state Water 'War': Media Frames and Weighing What is Best for the Apalachicola-Chattahoochee-Flint River Basin
	Faculty Mentor	Dr. David Radcliffe, Department of Crop & Soil Sciences
	Tatum Mortimer	Epidemiology of Equine *Staphylococcus aureus* in Georgia and Kentucky from 1995-2003
	Faculty Mentor	Dr. Susan Sanchez, College of Veterinary Medicine
Room B	**John Gaudet**	Studying Human Seizures Using Zebrafish as a Model
	Faculty Mentor	Dr. James Lauderdale, Department of Cellular Biology

	Camille Gregory	Investigation of the Protein Content of Hirano Bodies
	Faculty Mentor	Dr. Marcus Fechheimer, Department of Cellular Biology
	Jay Patel	Characterization of Striated Fiber Assemblins in *T. gondii*
	Faculty Mentor	Dr. Boris Striepen, Department of Cellular Biology
Room C	**Caitlin Cassidy**	The Art of Persuasion: How Small Business Owners Use Speech to Market Products in Roswell, GA
	Faculty Mentor	Dr. William Kretzschmar, Department of English
	Tyler Williamson	Business Model Generation and Energy Informatics
	Faculty Mentor	Dr. Rick Watson, Department of Management Information Systems
Room D	**Elodie Huguet**	Effects of Steel and Aluminum Shoes on Forelimb Action in Stock Horses
	Faculty Mentor	Dr. Kylee Duberstein, Department of Animal & Dairy Science
	Jonathan Jones	Renewable Energy-Powered Bulk Milk Cooling for Smallholder Dairy Farmers
	Faculty Mentor	Dr. William Kisaalita, Department of Biological & Agricultural Engineering
	Waring Trible	Cuticular Pheromones and Fire Ant Queens: Smells Like Mom
	Faculty Mentor	Dr. Ken Ross, Department of Entomology
Room G	**Jessica Alcorn**	The Validity of the News Marketing Hypothesis
	Faculty Mentor	Dr. Audrey Haynes, Department of Political Science
	Dana Higgins	Risk-taking in Midterm Elections
	Faculty Mentor	Dr. Charles Bullock, Department of Political Science
	Justin Leef	Salient Issues as Forces for Change in the Peach State: Bioscience and Research Meet Deep South Politics
	Faculty Mentor	Dr. Charles Bullock, Department of Political Science
Room H	**Mary Golden**	An Analysis and Application of Foreign Language Education Methodology
	Faculty Mentor	Dr. Victoria Hasko, Department of Language & Literacy Education
	Matthew Seitz	A Cold Calculus: Spending in K-12 Education
	Faculty Mentor	Dr. Catherine Sielke, Department of Lifelong Education, Administration & Policy
	Taylor Whelchel	Academic Relevancy in the College Classroom
	Faculty Mentor	Dr. Christopher Pisarik, Division of Academic Enhancement
Room J	**Dina Abdulhadi**	Deep Horizon: the Politicization of Science
	Faculty Mentor	Dr. Leara Rhodes, Grady College of Journalism & Mass Communications

	Rebecca Arnall	The Influence of Soren Kierkegaard on the Work of Walker Percy
	Faculty Mentor	Dr. Hugh Ruppersburg, Department of English
	Anisha Hegde	The Boom That Saved the Day
	Faculty Mentor	Dr. Leara Rhodes, Grady College of Journalism & Mass Communications

1:25 – 2:15 p.m. Fourth Concurrent Session

Classic Center, Athena Breakout Rooms A, B, D, G, H, J

Room A	**Khalil Farah**	Delegates' Personal Interests and their Influence on Crafting Congressional Qualifications at the Constitutional Convention
	Faculty Mentor	Dr. Keith Dougherty, Department of Political Science
	Nathaniel Ament-Stone	Campaign Finance and Vote Outcomes in U.S. House Primary Elections
	Faculty Mentor	Dr. Jamie Carson, Department of Political Science
	David Mapp	The Effects of Negative Political Campaign Advertising
	Faculty Mentor	Dr. James Bason, Survey Research Center
Room B	**Kathryn Clifford, Sophie Winkler**	The EEOC and the Federal Court of Appeals
	Faculty Mentor	Dr. Scott Ainsworth, Department of Political Science
	Camille Gregory	Screening for Domestic Violence in Divorce Mediation
	Faculty Mentor	Prof. Raye Rawls, The Fanning Institute
	Christen Hammock	Without Anchors: Standardizing Child Placement After Deportation
	Faculty Mentor	Dr. Larry Nackerud, School of Social Work
Room D	**Jason Bowman**	Analysis of the Inter-Rater Reliability of the Functional Movement Screen
	Faculty Mentor	Dr. Cathleen Brown, Department of Kinesiology
	Melesse Nune	LysR-type Transcriptional Regulators
	Faculty Mentor	Dr. Cory Momany, Department of Pharmaceutical & Biomedical Sciences
Room G	**Alyson Dankner**	A Culture Identified by Canines: How Dogs Have Become an Integral Part of the American Public Self
	Faculty Mentor	Dr. Katalin Medvedev, Department of Textiles, Merchandising & Interiors
	Christine Fekete	Traditional Textiles through a Modern Lens
	Faculty Mentor	Prof. Jennifer Crenshaw, Lamar Dodd School of Art

	Shelly Hagigi	Bedouin Dress: A Means of Cultural Continuity and Change
	Faculty Mentor	Dr. Katalin Medvedev, Department of Textiles, Merchandising & Interiors
Room H	**Ryan Prior**	Witch-Doctoring Tolstoy: Applying Traditional Healing Philosophies to *The Death of Ivan Ilych*
	Faculty Mentor	Dr. Katarzyna Jerzak, Department of Comparative Literature
	Jennifer Skinner	Italian Futurists and Fascism
	Faculty Mentor	Dr. Nell Andrew, Lamar Dodd School of Art
Room J	**Tyler Bugg**	Geographies of Expression: the Arts within Space and Scale
	Faculty Mentor	Dr. Amy Trauger, Department of Geography
	Daniel Cellucci	Remote Sensing as a Generative Tool in the Creation of Fine Art
	Faculty Mentor	Dr. Ralph Brown, Lamar Dodd School of Art
	Brittany Norman	Dust and Breath - Works of Art and Technology
	Faculty Mentor	Dr. Martijn Van Wagtendonk, Lamar Dodd School of Art

2:30 – 3:45 p.m. Fifth Concurrent Session

Classic Center, Athena Breakout Rooms A, B, C, D, G, H, J

Room A	**Lisa Baer, Kacie Caudle, Robert Gentry**	The Relationship Between Personal Beliefs and Family Values in International College Students from a Hungarian University
	Faculty Mentor	Dr. Tsu-Ming Chiang, Department of Psychological Science, Georgia College & State University
	Robert Daniel	Friends of Convenience
	Faculty Mentor	Dr. Michelle vanDellen, Department of Psychology
	Mona Malacane	The Influence of Popular Adolescent Television Programs
	Faculty Mentor	Dr. Leonard Martin, Department of Psychology
Room B	**Virginia Broyles**	Nice to Have: Expression and Movement through Film
	Faculty Mentor	Dr. Bala Sarasvati, Department of Dance
	Joanna Reising	*Victory Over the Sun*: The Russian Futurist Transcendence over Materiality
	Faculty Mentor	Dr. Nell Andrew, Lamar Dodd School of Art
Room C	**Debashis Ghose**	Stability Analysis of the Inhibitor Resistant Phenotype of AJP50 in Biomass Fermentations
	Faculty Mentor	Dr. Joy Doran Peterson, Department of Microbiology

	Courtney Ralston	Kinetic, Temperature Dependent and Structural Analyses Of YqhD, an Escherichia coli NADPH Dependent Oxidoreductase Enzyme
	Faculty Mentor	Dr. William Lanzilotta, Department of Biochemistry & Molecular Biology
Room D	**Christina Azahar**	Music Pedagogy in Latin America: A Case Study of El Sistema Venezuela and its International Expansion
	Faculty Mentor	Dr. Susan Thomas, Hugh Hodgson School of Music
	Smitha Ganeshan	Ready for Disaster
	Faculty Mentor	Dr. David Williams, Honors Program
	Matthew Passarello	Pronunciation of Word-Final [ə] by Older Male Speakers from the South of France
	Faculty Mentor	Dr. Diana Ranson, Department of Romance Languages
Room G	**Melissa Brown**	Black Stereotypes in Reality Television and the Reinforcement of Prejudiced Attitudes
	Faculty Mentor	Dr. Leonard Martin, Department of Psychology
	Daniel Smith	In the Image of the Artist
	Faculty Mentor	Dr. Asen Kirin, Lamar Dodd School of Art
	Jacob Young	Exploring the Life and Techique of Michael Chekhov
	Faculty Mentor	Prof. George Contini, Department of Theatre & Film Studies
Room H	**Sylvia Shin**	The Evolution of Aging in *Saccharomyces cerevisiae*
	Faculty Mentor	Dr. David Hall, Department of Genetics
	Stephen Thompson	Intramolecular Friedel-Crafts Cyclization with Arylsilanes
	Faculty Mentor	Dr. George Majetich, Department of Chemistry
Room J	**Tierney O'Sullivan**	Investigating Early Warning Signals and Critical Slowing Down in Changing Environments
	Faculty Mentor	Dr. John Drake, Odum School of Ecology
	John Rodriguez	Improving the Claims-Making Process in Context to the 2010 Deepwater Horizon Oil Spill
	Faculty Mentor	Dr. Leara Rhodes, Grady College of Journalism & Mass Communications
	Theresa Stratmann	Changing Environments: Effect on Extinction Time and Distribution
	Faculty Mentor	Dr. John Drake, Odum School of Ecology
	Sheena Zhang	An Analysis of Green Buildings: Comparing Tsinghua University's Sino-Italian Ecological and Energy-Efficient Building and UGA's Odum School of Ecology Building
	Faculty Mentor	Dr. Laurie Fowler, Odum School of Ecology

4:00 p.m. General Session

Classic Center, Athena Ballroom E

Introductions	Dr. David S. Williams, Associate Provost and Director, Honors Program
Remarks	Professor Jere W. Morehead, Senior Vice President for Academic Affairs and Provost
Excellence in Undergraduate Research Mentoring Awards	Dr. David C. Lee, Vice President for Research
Best Paper and UGA Libraries Research Award	Dr. Laura Jolly, Vice President for Instruction Ms. Deborah Dietzler, Executive Director, Alumni Association Ms. Caroline Barratt, Director, Miller Learning Center Library Commons
Introduction of Keynote Speaker	Ms. Shenna Zhang, Foundation Fellow '11, Ecology, Biology And Sustainable Design in the Built Environment
Keynote Address: *Doing Science in the Face of a National Emergency*	Dr. Samantha Joye, Department of Marine Sciences

5:00 p.m. *Science as Art**

Classic Center, Grand Hall South (downstairs)

Science as Art Poster #45	**Miles Keeney-Ritchie**	Extracting Power from Induced Airstreams on Expressways
	Faculty Mentor	Dr. John Schramski, Department of Biological & Agricultural Engineering

*****_Science as Art_ is the presentation of images or data gathered during the research process that demonstrate artistic principles such as balance, contrast, proportion, harmony and value. Mr. Keeney-Ritchie's submission was selected for the CURO 2011 Symposium *Science as Art* Award.

5:00 p.m. Poster Presentations

Classic Center, Grand Hall South (downstairs)

Poster #1	**Anuj Shukla**	Human Embryonic Stem Cell Derived Neurons as Biosensors for Neurotoxins
	Faculty Mentor	Dr. Steven Stice, Department of Animal & Dairy Science
Poster #2	**Garrett Casale**	Role of the Telomere Binding Protein TPP1 in Recruitment of Telomerase to Telomeres in Human Cancer Cells
	Faculty Mentor	Dr. Michael Terns, Department of Biochemistry & Molecular Biology
Poster #3	**Rachel Appelbaum**	An RNA-Protein Complex of a Prokaryotic Immune System
	Faculty Mentor	Dr. Michael Terns, Department of Biochemistry & Molecular Biology

Poster #4	**Carla Rutherford**	Morphological Changes Accompanying Killing of *Trypanosoma brucei brucei* by Human Serum
	Faculty Mentor	Dr. Stephen Hajduk, Department of Biochemistry & Molecular Biology
Poster #5	**Alexander Sevy**	Ty1 Element Antisense RNA Activity from Natural Saccharomyces Isolates
	Faculty Mentor	Dr. David Garfinkel, Department of Biochemistry & Molecular Biology
Poster #6	**Samar Aldrugh**	Exploring the Effect of Cysteine Mutations on Rce1p Substrate Recognition and Enzyme Efficiency
	Faculty Mentor	Dr. Walter Schmidt, Department of Biochemistry & Molecular Biology
Poster #7	**Daniel Hess**	Directed Differentiation of Human Embryonic Stem Cells to Mesoderm Lineages
	Faculty Mentor	Dr. Stephen Dalton and Dr. David Reynolds, Department of Biochemistry & Molecular Biology
Poster #8	**Byron Crowe**	Efficacy of Alternative and Combinatorial Drug Therapies in the Treatment of *Trypanosoma Cruzi* Infection
	Faculty Mentor	Dr. Rick Tarleton, Department of Cellular Biology
Poster #9	**Jeffrey Tran**	The Role of Indoleamine 2,3-Deoxygenase in CD8 T Responses to Influenza Infection
	Faculty Mentor	Dr. Kimberly Klonowski, Department of Cellular Biology
Poster #10	**David Liddle**	Polysialylation Changes During Human Stem Cell Development
	Faculty Mentor	Dr. Michael Pierce, Department of Biochemistry & Molecular Biology
Poster #11	**Sarah-Bianca Dolisca**	Effects of N-Acetylglucosaminyltransferase Expression Levels on Colorectal Adenoma Progression
	Faculty Mentor	Dr. Michael Pierce, Department of Biochemistry & Molecular Biology
Poster #12	**Shanterian Hester**	Exercising Glycoprotemics to Develop New Methodologies for the Detection of Early Breast Cancer
	Faculty Mentor	Dr. Michael Pierce, Department of Biochemistry & Molecular Biology
Poster #13	**Melanie Fratto**	Do Black-Furred Animals Compensate for High Solar Absorption with Smaller Hairs? A Test with a Polymorphic Squirrel Species
	Faculty Mentor	Dr. Andrew Davis, Odum School of Ecology
Poster #14	**Malavika Rajeev**	The Effect of Parasite Infection on Monarch Butterfly Mating Behavior
	Faculty Mentor	Dr. Sonia Altizer, Odum School of Ecology

Poster #15	**Samuel Willis**	Diversity of Orchid Fungal Symbionts in Estonian Mine Tailings
	Faculty Mentor	Dr. Richard Shefferson, Odum School of Ecology
Poster #16	**Stenka Vulova**	Nutrient Enrichment Effects on Detrital Food Resources in Streams: Implications for Microbes and Consumers
	Faculty Mentor	Dr. Amy Rosemond, Odum School of Ecology
Poster #17	**Rebecca Risser**	Effects of *Ligustrum sinense* Presence and Removal on Nitrogen Mineralization Rates
	Faculty Mentor	Dr. Paul Hendrix, Odum School of Ecology
Poster #18	**Courtney Allen**	Salamander Trophic Position and Diet Diversity in Southern Appalachian Headwater Streams
	Faculty Mentor	Dr. Amy Rosemond, Odum School of Ecology
Poster #19	**Waring Trible**	Cuticular Pheromones and Fire Ant Queens: Smells Like Mom
	Faculty Mentor	Dr. Ken Ross, Department of Entomology
Poster #20	**Georgianna Mann**	*Bufo marinus* Pathogen and Parasite Analysis as a Model for Ecosystem Change
	Faculty Mentor	Dr. Sonia Hernandez, Warnell School of Forestry & Natural Resources
Poster #21	**Erin Giglio**	Sensory Systems in *Drosophila* Courtship
	Faculty Mentor	Dr. Kelly Dyer, Department of Genetics
Poster #22	**Zijing Guo**	Telomere Recombination in Wild Type Yeast Cells
	Faculty Mentor	Dr. Michael McEachern, Department of Genetics
Poster #23	**Rakia Nasir**	Analysis of rRNA Maturation in *Escherichia coli*
	Faculty Mentor	Dr. Sidney Kushner, Department of Genetics
Poster #24	**Anisha Hegde**	Medical Therapies and Clinical Characteristics among Patients with Duchenne and Becker Muscular Dystrophy
	Faculty Mentor	Dr. Michael Terns, Department of Biochemistry & Molecular Biology
Poster #25	**Erica Gibson**	How Effective Are "Fuzzies" as a Tool for Developing a Holistic Understanding of Basic Genetic Principles?
	Faculty Mentor	Dr. Eve Wurtele, Department of Genetics, Development & Cell Biology, Iowa State University
Poster #26	**Akanksha Rajeurs**	Development of a System for Targeted Mutagenesis in *Mycobacterium Tuberculosis*
	Faculty Mentor	Dr. Russell Karls, Department of Infectious Diseases
Poster #27	**Elena James**	Development of a Plasmid to Detect Cobalamin Transport Mutants in *Mycobacteria Tuberculosis*
	Faculty Mentor	Dr. Russell Karls, Department of Infectious Diseases

Poster #28	**Oluremi Ojo**	Expression of the DBL3x Domain of VAR2CSA in *E. coli*
	Faculty Mentor	Dr. David Peterson, Department of Infectious Diseases
Poster #29	**Jenna Adair**	Virulence Associated Protein A is the Only Vap-Family Member Required for Virulence in the Intracellular Actinomycete Pathogen *Rhodococcus equi*
	Faculty Mentor	Dr. Mary Hondalus, Department of Infectious Diseases
Poster #30	**Elizabeth May**	Assessment of 5-Aminolevulinate Acid Synthase Expression & Purification Methods
	Faculty Mentor	Dr. Harry Dailey, Department of Biochemistry & Molecular Biology
Poster #31	**Lauren McLeod**	*Zot* as a Potential Virulence Factor for *Neisseria meningitidis*
	Faculty Mentor	Dr. Anna Karls, Department of Microbiology
Poster #32	**Debashis Ghose**	Stability Analysis of the Inhibitor Resistant Phenotype of AJP50 in Biomass Fermentations
	Faculty Mentor	Dr. Joy Doran Peterson, Department of Microbiology
Poster #33	**Aisha Mahmood**	Membrane Topologies of *E. coli* HemH and HemG Biosynthetic protein studies using Alkaline Phosphatase Fusions
	Faculty Mentor	Dr. Harry Dailey, Department of Microbiology
Poster #34	**Lauren Sullivan**	Presence of Newcastle Disease Through Immunohistochemistry in Tissues of Chickens Diagnosed with the Disease in the Field
	Faculty Mentor	Dr. Corrie Brown, College of Veterinary Medicine
Poster #35	**Anna White**	Clinico-pathological Characterization of Newly Isolated Newcastle Disease Viruses from Dominican Republic, Belize and Peru
	Faculty Mentor	Dr. Corrie Brown, College of Veterinary Medicine
Poster #36	**Vinh Dong**	A Sensitive Approach in Evaluating the PBP (Penicillin Binding Protein) Binding Specificity of Penicillins using Activity Based Protein Profiling
	Faculty Mentor	Dr. Timothy Long, Department of Pharmaceutical & Biomedical Science
Poster #37	**Song Kue**	Comparing the Effects of the Ras Inhibitor Manumycin A with Novel Ras Converting Enzyme 1 Inhibitors
	Faculty Mentor	Dr. Shelley Hooks, Department of Pharmaceutical & Biomedical Science
Poster #38	**Bhavi Patel**	The Role of Histidines in pH Dependence of Human Equilibrative Nucleoside Transporter 3
	Faculty Mentor	Dr. Rajgopal Govindarajan, Department of Pharmaceutical & Biomedical Science

Poster #39	**Alexandre Matte Santos**	Study of the Genetic Diversity of Isolated *Veratrum woodii* Populations in Georgia using AFLPs
	Faculty Mentor	Dr. Wendy Zomlefer, Department of Plant Biology
Poster #40	**Katherine Perofsky**	The Use of PCR Assays to Determine the Extent of Zones of Hybridization of *Culex Pipiens Quinquefasciatus* and *Culex Pipiens Pipiens* in Georgia
	Faculty Mentor	Dr. Daniel Mead, Department of Population Health
Poster #41	**Grant Perry**	Expression of Heat Shock Proteins 27 & 72 in Canine Intracranial Meningiomas
	Faculty Mentor	Dr. Simon Platt, College of Veterinary Medicine
Poster #42	**Asaph Levy**	Kynureninase and Its Affect on Late Onset Diseases
	Faculty Mentor	Dr. Robert Phillips, Department of Chemistry
Poster #43	**Jessica Fazio**	Luche Reduction
	Faculty Mentor	Dr. Richard Hubbard, Department of Chemistry
Poster #44	**Victoria DeLeo**	Intron Loss and Gain in the Br2/Dw3 Gene across Grass Subfamilies
	Faculty Mentor	Dr. Katrien Devos, Department of Crop & Soil Sciences
Poster #45	**Miles Keeney-Ritchie**	Extracting Power from Vehicle Induced Airstreams on Expressways
	Faculty Mentor	Dr. John Schramski, Department of Biological & Agricultural Engineering
Poster #46	**Erin Roberts**	Using Fluorescence to Identify Insect Damage to Cotton Bolls
	Faculty Mentor	Dr. Mark Haidekker, Department of Biological & Agricultural Engineering
Poster #47	**Katherine Riccione, Ryan Boelter, Tina Carson, Chase Mooney**	Design of a Computed Tomography Scanner with Components from an Existing DEXA Machine
	Faculty Mentor	Dr. Mark Haidekker, Department of Biological & Agricultural Engineering
Poster #48	**Akil Piggott**	Women with Naturally Bright Red Hair Report Higher Pain in Response to Thermal Stimuli and Reduced Pain in Response to a Mild Muscle Injury Compared to Dark-Haired Women
	Faculty Mentor	Dr. Pat O'Connor, Department of Exercise Science
Poster #49	**Allegra Yeley**	Sanctity as a Means of Conservation: Tongariro National Park, New Zealand
	Faculty Mentor	Dr. Fausto Sarmiento, Department of Geography
Poster #50	**Emily First**	Mineral Probes of Magmatic Processes at Valles Caldera, Northern New Mexico
	Faculty Mentor	Dr. Michael Roden, Department of Geology

Poster #51	**Ashleigh Gainer**	The Biogeochemistry of Hammock Groundwater
	Faculty Mentors	Dr. Samantha Joye, Department of Marine Sciences
Poster #52	**Caroline West**	Breastfeeding Practices among Hispanic Women in Athens
	Faculty Mentor	Dr. Susan Tanner, Department of Anthropology
Poster #53	**Laura O'Neill**	The Effect of N-Back Stimuli Type on Performance
	Faculty Mentor	Dr. Rebecca S. Marshall, Department of Communication Sciences & Special Education
Poster #54	**Ai Taniguchi**	Linguistic and Musical Coherence
	Faculty Mentor	Dr. Paula Schwanenflugel, Department of Educational Psychology & Instructional Technology
Poster #55	**Amarachi Anukam**	Healthy Teens: a Longitudinal Study of 'At Risk' Secondary Students
	Faculty Mentor	Dr. Pamela Orpinas, Department of Health Promotion & Behavior
Poster #56	**Eric Ekwueme**	The Use of Twitter by University of Georgia Student Organizations and Their Members
	Faculty Mentor	Dr. Brenda Cude, Department of Housing & Consumer Economics
Poster #57	**Ashley Bartlett**	The Elements of Chinese Grand Strategy: Applying a New Analytical Approach
	Faculty Mentor	Dr. Brock Tessman, Department of International Affairs
Poster #58	**Courtney Witt**	Sexual Attitudes, Media Use and Norms: Assessing Favorably to Sexually Explicit Media and Exposure Effects on Norm Distortion
	Faculty Mentor	Dr. Tom Reichert, Department of Advertising and Public Relations
Poster #59	**Archil Japardize**	Security Contractors: The Future of Peacekeeping?
	Faculty Mentor	Dr. Fred Manget, School of Law
Poster #60	**Cody Nichol**	Emotion Regulation in Children: Implications for Affect and Childhood Psychopathology
	Faculty Mentor	Dr. Cynthia Suveg, Department of Psychology
Poster #61	**Litty Varghese**	Measurements of Inhibition: The Relation between the Eriksen Flanker Task and the Stop Signal Task
	Faculty Mentor	Dr. Jennifer McDowell, Department of Psychology
Poster #62	**Lindsay Briggs**	Sex Differences in the Mechanisms Underlying Facial Expression Recognition: Effects of Cognitive Load and Facial Mimicry on Facial Expression Recognition
	Faculty Mentor	Dr. Janet Frick, Department of Psychology

Poster #63	**Laura Smart**	Dialectical Behavior Therapy and Distraction: Using the Cold Pressor Task to Determine Efficacy
	Faculty Mentor	Dr. Rheeda Walker-Obasi, Department of Psychology
Poster #64	**Madison Asef**	Lutein and Zeaxanthin Availability in Bodily Tissues
	Faculty Mentor	Dr. Billy Hammond, Department of Psychology
Poster #65	**Vivien Tsou**	"I've got the rhythm, she's got the blues." Relations between Temperament, Maternal Stress and the Development of a Sleep-Wake Rhythm in Infancy
	Faculty Mentor	Dr. Anne Shaffer, Department of Psychology
Poster #66	**Kristen Cerny, Julia Taylor**	Assessing Baseline Characteristics of Mother-Child Dyads Participating in the AFFECT (A Family Focused Emotion Communication Training) Pilot Study
	Faculty Mentor	Dr. Anne Shaffer, Department of Psychology
Poster #67	**Quincy Zhong**	Glare Disability, Photostress Recovery and Chromatic Contrast in Relation to Retinal Lutein and Zeaxanthin
	Faculty Mentor	Dr. Billy Hammond, Department of Psychology

Excellence in Undergraduate Research Mentoring Awards

The Office of the Senior Vice President for Academic Affairs and Provost and the Honors Program established the Excellence in Undergraduate Research Mentoring Award in 2001. This award recognizes faculty, departments, and programs devoted to outstanding research mentorship of undergraduate students.

Awards will be presented at the General Session of the CURO 2011 Symposium on Monday, April 4, 2011 at 4:00 p.m. in the Classic Center, Athena Ballroom E.

2011 Awards

Master Level Faculty Award
Dr. Eric Stabb, Department of Microbiology
Early Career Faculty Award
Dr. John Drake, Odum School of Ecology
Program Award
Savannah River Ecology Laboratory
Dr. Kenneth McLeod, Interim Director

2010 Awards

Early Career Faculty Award
Dr. John C. Maerz, Warnell School of Forestry & Natural Resources

2009 Awards

Early Career Faculty Award
Dr. Brian S. Cummings, Department of Pharmaceutical & Biomedical Sciences
Dr. Anna C. Karls, Department of Microbiology
Dr. Dawn T. Robinson, Department of Sociology

2008 Awards

Master Level Faculty Award
Dr. John J. Maurer, College of Veterinary Medicine
Early Career Faculty Award
Dr. Walter K. Schmidt, Department of Biochemistry & Molecular Biology
Program Award
Biomedical and Health Sciences Institute
Dr. Harry S. Dailey, Director

2007 Awards

Master Level Faculty Award
Dr. Timothy Hoover, Department of Microbiology
Early Career Faculty Award
Dr. Steven Stice, Department of Animal & Dairy Science

Excellence in Undergraduate Research Mentoring Awards

2006 Awards

Master Level Faculty Award
Dr. Patricia Hunt-Hurst, Department of Textiles, Merchandising & Interiors
Early Career Faculty Award
Dr. Rodney Mauricio, Department of Genetics
Graduate Student Award
Christopher Anderson, PhD candidate in Ecology
Graduate Student Recognition
Dawn Holligan, PhD candidate in Plant Biology

2005 Awards

Faculty Awards
Dr. Gary Barrett, Odum School of Ecology
Dr. Sidney Kushner, Department of Genetics
Department Award
Department of Cellular Biology

2004 Awards

Faculty Award
Dr. William S. Kisaalita, Department of Biological & Agricultural Engineering

2003 Awards

Faculty Award
Dr. Jody Clay-Warner, Department of Sociology
Department Award
Department of Microbiology
Dr. Duncan Krause, Department Head
Dr. Timothy Hoover, Undergraduate Coordinator
Program Award
The Pratt Laboratory of Plant Genomics and Bioinformatics
Dr. Lee H. Pratt, Department of Plant Biology
Dr. Marie-Michèle Cordonnier-Pratt, Department of Plat Biology

2002 Awards

Faculty Awards
Professor William D. Paul, Jr., Lamar Dodd School of Art
Dr. Katherine Kipp, Department of Psychology
Faculty Recognition
Dr. Susan Sanchez, College of Veterinary Medicine
Department Award
Department of Biochemistry & Molecular Biology
Dr. J. David Puett, Department Head

Program Award

"Physics Beyond the Boundaries": National Science Foundation, REU Program
Dr. Loris Magnani, Principal Investigator, Department of Physics & Astronomy
Dr. Heinz-Bernd Schuttler, Department Head, Department of Physics & Astronomy
Dr. Jonathan Arnold, Department of Genetics
Dr. Susmita Datta, Georgia State University
Dr. David Logan, Clark Atlanta University
Dr. William Steffans, Clark Atlanta University

2001 Awards

Faculty Award

Dr. Marcus Fechheimer, Department of Cellular Biology

Faculty Recognition

Dr. David MacIntosh, Department of Environmental Health Sciences
Dr. Dean Rojek, Department of Sociology

Department Award

Department of Genetics
Dr. John MacDonald, Department Head

Program Award

Savannah River Ecology Laboratory
Dr. Paul Bertsch, Director

Thanks and Acknowledgements

Special Assistance Provided by:

Ms. Whitney Ising	Student Worker, Center for Undergraduate Research Opportunities
Mr. Alex Knoblock	Student Worker, Center for Undergraduate Research Opportunities
Ms. Dorothé Otemann	Coordinator of External Affairs, Honors Program
Ms. Lindsay Salmon	Administrative Associate, Center for Undergraduate Research Opportunities

Graduate Student Reviewers for CURO 2011 Symposium

Ms. Lisa Bolding	Department of English
Ms. Paulina Bounds	Department of English
Ms. Carol M. Britton-Laws	School of Social Work
Mr. Sean Buskirk	Department of Infectious Diseases
Mr. Phillip Callihan	Department of Pharmaceutical & Biomedical Sciences
Mr. Paul Carlsen	Department of Political Science
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Dr. Martin Rogers	Coordinator of Courses & Advising, Honors Program
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Deep Horizon: the Politicization of Science

Dina Abdulhadi, Roosevelt @ UGA
Dr. Leara Rhodes, Grady College of Journalism & Mass Communications, University of Georgia

Up to this point, response to the Deepwater Horizon Oil Spill has mostly addressed economic impacts for Gulf residents. The Gulf Ecosystem Restoration Task Force aims to address issues of long-term environmental resiliency in the Gulf Region, including environmental issues, such as hypoxia, that existing before the spill. Which concerns are deemed important enough to address, however, depend on initial assessments of how the spill has changed Gulf ecosystems. The different hands involved in research--BP, Federal environmental agencies, and university researchers--have little coordination or collaboration. Estimates of oil persistence conflict; as of August 2010, FEMA stated that only 25 percent of the oil remained in the Gulf Ocean, while the Georgia Sea Grant estimated between 70 and 79 percent [1]. Disagreement over this foundational understanding and the effect of dispersant use will make future environmental policies insufficient in addressing human and ecosystem health; while Exxon ended cleanup after oil was no longer easily visible, NOAA discovered that "very little" of the original oil from Exxon Valdez had "disappeared" by 2007, almost 18 years after the spill [2]. By researching the role of science in creating policy with retrospect to Exxon Valdez, this study aims to outline potential strategies for standardizing research in order to prevent ideological or economic biases from preventing implementation of needed environmental protection measures.

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Virulence Associated Protein A Is the Only Vap-family Member Required for Virulence in *Rhodococcus equi*

Jenna Adair
Dr. Mary Hondalus, Department of Infectious Diseases, University of Georgia

Rhodococcus equi (*R. equi*) is a facultative intracellular pathogen of macrophages. It causes severe pneumonia in young foals, and has also emerged as an opportunistic pathogen in immunocompromised people. *R. equi* contains a virulence plasmid housing a pathogenicity island (PAI) upon which resides the novel *vap* gene family encoding the virulence-associated-proteins (Vaps ACDEFGHIX). The functions of the individual Vap proteins are unknown but studies have shown that the *vapA* gene is essential for virulence. Deletion of this gene abolishes the ability of *R. equi* to replicate within macrophages and to cause disease in a mouse infection model system. However, expression of *vapA* alone is not sufficient; additional PAI-encoded genes are required for manifestation of the full virulence phenotype. The focus of this study was to determine whether any of the related Vap protein family members are necessary for *R. equi* virulence. To address this question, a series of mutants with deletions of one or combinations of various *vap* genes were constructed via allelic exchange and their growth capacity in macrophages was analyzed by dilution plating of infected macrophage lysates. Results from intramacrophage growth assays showed that deletion of all the *vap* genes, with the exception of *vapA*, had no significant impact on the bacterium's ability to replicate in macrophages. These data suggest that *vapA* is the only *vap* protein absolutely essential for virulence.

The Validity of the News Marketing Hypothesis

Jessica Alcorn, CURO Summer Fellow
Dr. Audrey Haynes, Department of Political Science, University of Georgia

Network news, introduced during the mid 20th century, was originally regarded as a prompt and parsimonious manner of learning about the most important events of the day—plain and simple-facts. However, as network news viewership increased, reaching high points in the 1980s and 1990s, so did the number of possible news sources-the traditional newspaper, cable news, the internet, and talk radio, to name a few. As a result, news networks were forced into a more competitive market. In order to retain viewers, network news stations began marketing their news to particular loyal subsets of the population. Using a coding system, we systematically examined the transcripts from Presidential debate commentary for three major television networks-FOX, CNN, and NBC. We exclusively analyzed the period from 1980 to 2009, as technology allowed for an increase in overall TV and news viewership during this time period. This study seeks to determine whether the materialization of various competing news sources has permitted each station to target a specific demographic and ideological viewpoint, thereby yielding the audience of each news source largely homogenous. We are still currently working on measuring the significance of the quantitative results gathered in this study. If the news marketing hypothesis were validated, a news viewer's perception of critical events could be considerably skewed according to the news outlet chosen.

Exploring the Effect of Cysteine Mutations on Rce1p Substrate Recognition and Enzyme Efficiency

Samar Aldrugh, CURO Scholar
Dr. Walter Schmidt, Department of Biochemistry & Molecular Biology, University of Georgia

Uncontrolled cell proliferation and migration are common characteristics of malignancies. One causative factor is the aberrant constitutive activation of Ras GTPase proteins, which can result in tumorigenesis. In fact, Ras point mutations are generally found in 20% to 30% of all human cancers, and higher incidences in specific tumors (e.g. pancreatic). Ras undergoes several post-translational modifications, including proteolysis by Rce1p, which cleaves within a C-terminal-CaaX motif found on precursors of Ras and other substrates, such as the a-factor yeast mating pheromone. Initially, it was proposed that Rce1p is a cysteine protease. A cysteine-less form of Rce1p, however, is functional *in vivo,* indicating that cysteines are not critical to the enzymatic activity of Rce1p. On the other hand, we have observed that cysteine-less Rce1p does not efficiently cleave short synthetic peptides based on Ras and a-factor *in vitro*, indicating a possible role for cysteines in substrate recognition. We hypothesize that Rce1p binds substrates in a dual mode via a CaaX proximal cysteine-dependent recognition element (PRE), and a CaaX distal cysteine-independent recognition element (DRE). We predict that WT Rce1p relies on both PRE and DRE for recognizing and cleaving its substrates, whereas cysteine-less Rce1p relies on DRE. This prediction is being evaluated with a series of *in vivo* reporters having modified recognition elements in combination with WT and cysteine-less Rce1p. We anticipate that our findings will better our understanding of Rce1p mechanism of action to effectively design inhibitors that can be used as anticancer drugs.

Salamander Trophic Position and Diet Diversity in Southern Appalachian Headwater Streams

Courtney Allen
Dr. Amy Rosemond, Odum School of Ecology, University of Georgia

Diet and life history data are important to understanding how organisms will respond to global environmental changes. Mobilization of nitrogen (N) and reductions in availability of phosphorous (P) globally are influencing organic matter processing in aquatic ecosystems. These changes in key food resources will influence production and distribution of top predators, such as stream salamanders. We investigated how salamander elemental body composition and diet varied with body size in non-impacted

streams. Through investigation of carbon (C), N and P content as well as isotopic signatures, we gathered baseline data on trophic position of black-bellied salamanders, Desmognathus quadramaculatus, (n = 10) in five southern Appalachian headwater streams at the Coweeta Long-term Ecological Research (LTER) site. Additionally, through gut content analysis, we investigated the diet composition of the salamanders. Using linear regression, we measured declines in body C:N and C:P, and C and N isotopes of D. quadramaculatus with increasing body size. Although changes in N and P concentrations are expected with increasing body size in vertebrates due to potential diet shifts and bone growth, size-dependent isotope patterns were not explained by differences in diversity or composition of invertebrate prey items. Further examination of the composition of prey items in D. quadramaculatus guts may explain size-dependent declines in body C and N isotopes. Understanding baseline trophic dynamics in freshwater systems will allow us to quantify and predict the relative impacts of various ratios of N and P inputs, as well as other types of global change on headwater stream food webs.

Campaign Finance and Vote Outcomes in U.S. House Primary Elections

Nathaniel Ament-Stone, Roosevelt @ UGA
Dr. Jamie Carson, Department of Political Science, University of Georgia

Even as public confidence in Congress sits near all-time recorded lows— a recent CBS poll pegs congressional approval at 24 percent—retention rates for House incumbents remain historically high, with 94 percent (on average) of incumbents reelected, and all but 11 renominated in party primaries, in the past four election cycles. High retention rates, despite public disapproval, represent a loss to the public interests of competitive elections and responsive representation, and prompt the question of how to promote greater levels of effective electoral competition—that is, competition which, on average, lowers incumbent renomination rates and victory margins. Based on an examination of how campaign spending levels affect renomination rates in the House of Representatives, this paper compares alternative campaign finance regulations to incentivize primary competition. Applying data from previous studies correlating campaign spending to election outcomes, this presentation compiles relevant political science research and incorporates recent election data and legislative history. Several possible alterations to campaign finance law are then compared based on their projected cost-effectiveness, political and administrative feasibility, and effects on free speech. The alternatives examined are a repeal of individual campaign contribution limits, a matching public subsidy scheme for primary challengers who raise a starting sum of $25,000, and a lower ($2,400 per primary election) limit on contributions from party or political action committees. The research concludes that the most effective policy, repealing individual contribution limits, is also the likeliest to withstand Supreme Court First Amendment review, though it faces challenges regarding political feasibility.

Healthy Teens: a Longitudinal Study of 'At Risk' Secondary Students

Amarachi Anukam, CURO Summer Fellow
Dr. Pamela Orpinas, Department of Health Promotion & Behavior, University of Georgia

Healthy Teens is a longitudinal study of a cohort of students from Northeast Georgia who were surveyed yearly from grades six through twelve. The goal of Healthy Teens is to examine the developmental pathways that students follow during middle and high school—crucial stages in the journey to adulthood. In this study, we explored the relation between neighborhood environment and delinquent behavior. The sample consisted of 581 students (52.5% male, 45.4% Caucasian, 38.2% African American, 11.2% Latino, 1.2% Asian, and 4% Multiracial/Other). In sixth grade, students attended one of nine middle schools in NE Georgia, representing a diverse group of schools (urban/rural location, SES of students, racial diversity). Using an adapted version of the Neighborhood Observational Checklist, we collected data on physical characteristics of the neighborhoods of the last known address of Healthy Teens participants. Based on participant

self-reported data, we have identified three delinquency trajectories. We compared neighborhood characteristics, for example, condition of homes, police presence, type of housing, and graffiti, by delinquency categories. None of the neighborhood characteristics differed significantly by delinquency trajectory. The presentation will discuss the qualitative aspects of the students' resident communities and dropout rates for each trajectory. Through further analysis of data from the Healthy Teens study, we hope to understand how adolescent behaviors interact, so that strong prevention programs may be developed for youth, families, and schools. Such prevention programs will aim to help youth make healthy and non-violent choices.

An RNA-Protein Complex of a Prokaryotic Immune System

Rachel Appelbaum, CURO Scholar
Dr. Michael Terns, Department of Biochemistry & Molecular Biology, University of Georgia

Recently, a small RNA-guided prokaryotic immune system was discovered that protects organisms from viruses, plasmids and other invaders. This immune system is called the CRISPR (Clustered, Regularly Interspaced Short Palindromic Repeat)-Cas (CRISPR-Associated) system and is composed of small RNAs from the CRISPR gene locus called prokaryotic silencing, or (psi)RNAs, and proteins from the Cas genes. The focus of this research is a specific psiRNA-Cas protein complex that was isolated in the Terns' lab and shown to function in psiRNA-guided destruction of invader RNA. The specific goals of this research include: (1) to reconstitute the RNA-protein complex and show that it binds psiRNA and cleaves target RNA; (2) to understand RNA-protein interactions within the complex; (3) to determine protein-protein interactions within the complex; and (4) to determine which proteins are required for function of the complex. The reconstitution of this RNA-protein complex from incubation of synthetic psiRNA with recombinant Cas proteins shows cleavage of a target RNA sequence, like it is in vivo activity. The results of protein co-expression assays (via simultaneous transformation of two plasmids with different selection markers) indicate at least three instances of protein-protein interactions between two of the Cas proteins. RNA binding studies suggest that four of the six Cas proteins are critical for association with the psiRNA. All six of the Cas proteins are required for the RNA-protein complex to function efficiently. Understanding the molecular organization of this RNA-protein complex is vital in understanding the mechanism of prokaryotic defense against viruses and other potentially harmful mobile genetic elements.

The Influence of Soren Kierkegaard on the Work of Walker Percy

Rebecca Arnall
Dr. Hugh Ruppersburg, Department of English, University of Georgia

The existential movement, especially the writings of Christian existentialist Soren Kierkegaard, influenced the writings of Walker Percy, a philosophical novelist of the American South. In his works, Kierkegaard describes three stages through which he believes people move in their search to find their reason for existence, or the worth, significance, or authenticity they find in their lives. He calls these the aesthetic, ethical, and religious stages. According to Kierkegaard, not all people progress through all three stages. Some even regress, yet at any time they will reside in one of the three stages. After comparing the protagonists of Percy's fiction to Kierkegaard's stages as outlined in his books *Either/Or* (1843) and *Fear and Trembling* (1843), I have found that, following a sudden realization regarding the futility of their pursuits, each of Percy's protagonists follows a different path through Kierkegaard's stages in his search for meaning. This search is often colored by the loose brand of Catholicism practiced by Percy's protagonists, which often hinders them from reaching the religious stage. This research explores the influence of Kierkegaard's three stages on Percy's fiction, as he explores each protagonist's individual struggles and search for meaning. Understanding Kierkegaard's influence on Percy—especially on the struggles of his protagonists—enables an understanding of Kierkegaard's thought and of existentialism in general.

Lutein and Zeaxanthin Availability in Bodily Tissue

Madison Asef
Dr. Billy Hammond, Department of Psychology, University of Georgia

Lutein and zeaxanthin are two carotenoids, found readily in green, leafy vegetables, known to deposit heavily in adipose tissue and in the retina, where they are referred to as macular pigment. Macular pigment has protective benefits against age-related macular degeneration by reducing the amount of oxidative stress in the retina. The level of macular pigment appears to vary among individuals according to percentage body fat. The purpose of this experiment is to evaluate the relation between macular pigment and body fat percentage and to potentially explain covariates of lutein absorption in the tissue after a dietary intervention. 86 subjects, between the ages of 18-40, completed measures of macular pigment optical density (MPOD) and body composition. Heterochromatic flicker photometry was used to determine MPOD and dual-energy X-ray absorptometry (DXA) scans assessed percentage body fat. Baseline data indicated an inverse relationship between body fat percentage and macular pigment ($p<0.05$). 63 subjects remain in the ongoing study, 10 of which have completed all measurements through the 12-month study. Visual analysis of the completed data suggests that the inverse relationship no longer exists, possibly due to other variables including sex, blood lipid values, body fat distribution, and serum response to lutein. Identifying the role of these covariates may contribute to an understanding of the competition hypothesis which states that adipose tissue and retinal tissue compete for absorption of lutein.

Non-Formal Music Education in Latin America: A Case Study of El Sistema Venezuela and Its International Expansion

Christina Azahar, CURO Apprentice
Dr. Susan Thomas, Hugh Hodgson School of Music, University of Georgia

The Venezuelan music education program, El Sistema, is a groundbreaking youth orchestra system that demonstrates a praxis of Paolo Freire's theory, the Pedagogy of the Oppressed. By utilizing music as a force of social change, El Sistema seeks to improve children's lives not simply through providing material resources, but also by changing students' perspectives on their identity and their responsibilities and rights as a citizen. This "re-humanizing" educational method is central to Freire's theory, and El Sistema has had immense success in developing not only knowledgeable citizens, but also great artists through a philosophical and spiritual approach to learning music. Because of this, it has grown from a small program in Venezuela into an international movement, and has served as a model for socially conscious music education programs in Latin America and across the world. El Sistema's expansion raises the following questions: How is El Sistema's pedagogy adapted to other societies? Why is it so effective in creating social change? Does the openly political ideology of El Sistema transfer along with its music pedagogy? To answer these questions, I will examine case studies of El Sistema-derived programs in both the United States and Colombia to determine how this pedagogy has been used for both structural and humanist reform. This will include reading interviews of students, teachers, and policy-makers, as well as reviewing scholarly literature on El Sistema and non-formal education in Latin America. Through this study I hope to demonstrate how music can both materially and humanistically improve society's well-being.

The Relationship between Personal Beliefs and Family Values in International College Students from a Hungarian University

Lisa Baer, Kacie Caudle & Robert Gentry
Dr. Tsu-Ming Chiang, Department of Psychological Science, Georgia College & State University

An individual's personal beliefs often reflect their family and cultural values. These beliefs may vary with socio-historical changes. However, limited research has been conducted to examine whether personal beliefs and ideologies change across generations in the Hungarian society because of the language barrier. Hungarian students are now taught basic understanding of the English language, which

makes it possible for data collection. This research aims to contrast the family core values of international students collected from a Hungarian University. Sixty-seven international students (Male = 13), with average ages of 23.6 for male and 21.61 for female participated in the study. This cross-cultural study in family values and parental beliefs is beneficial to increase awareness of culture's core beliefs and values. A survey was used to explore ethnic norms, parenting techniques, and future parenting techniques through quantitative and qualitative measures. Particular interests include comparisons between students' past experiences and future plans as prospective parents in permitted age to date, differences in bedtime and curfews, and parental involvement in daily life, etc. It is expected that participants' future plans are consistent with their parental beliefs in items that either they accepted or perceived as reasonable. Preliminary results, utilizing SPSS, revealed significant relationships between parental values and individual beliefs in group dating ($r = .87$, $p = .01$), individual dating ($r = .64$, $p = .01$), make up age ($r = .53$, $p = .01$), sleepover ($r = .69$, $p = .01$). More data and results will be shared at the CURO 2011 Symposium.

Frequency Distributions of Japanese Characters

C. T. Bailey, CURO Summer Fellow
Dr. William Kretzschmar, Department of English, University of Georgia

The linguistics of speech is a new model of language study which gives pride of place to language in use (Kretzschmar 2009). Instead of relying on rules to describe language, it uses frequency information. One of its central findings, the A-curve, reveals that in a text there are a few very common linguistic items and many uncommon ones. Research has shown that variant vowel realizations and words both follow this distribution, but researchers have not addressed meaning-carrying items smaller than the word. To remedy this, my study examined kanji, Japanese characters that carry meaning and can be smaller than a word. First, I collected 70 interviews with Japanese musicians from the Internet. The data was subdivided into male and female subsamples, and Wordsmith Tools was used to create a list of kanji frequencies for both. The subsample and total frequencies were then plotted using Open Office Calc. I found that kanji did form an A-curve, and that, furthermore, this A-curve exhibited the scaling property predicted by the linguistics of speech. This meant that though the A-curve was present at multiple levels of scale, the subsample frequencies did not reflect the frequencies in the data as a whole. These findings are significant because they support the linguistics of speech as a robust model of language and suggest that similar forces may operate across multiple levels of linguistic analysis. This challenges the common practice of separating areas like syntax, morphology (which studies word formation), and phonology (which studies speech sounds).

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Tri-state Water 'War': Media Frames and Weighing What Is Best for the Apalachicola-Chattahoochee-Flint River Basin

Joshua Barnett
Dr. David Radcliffe, Department of Crop & Soil Sciences, University of Georgia

In the southern United States a modern-day environmental dispute is taking place. At the center of this controversy is the Apalachicola-Chattahoochee-Flint (ACF) river basin. The large river basin encompassing Alabama, Georgia, and Florida has spurred much economic and ecological strife as each state has lobbied for its own interests in this incredible water resource. Much attention has been focused on the "Tri-State Water War" by television and print media, and it is those media that have named the dispute in this way. Commentary on the dispute has likened it to "battles," "struggles," and "fights to the death." Indeed, it is a battle being waged in the courtrooms, on the editorial pages of local newspapers, and, recently, on the cinematic screen. Drawing from news stories in the *Atlanta Journal-Constitution* and case studies presented

in the recent documentary entitled "Chattahoochee: From Water War to Water Vision," I answer the question, How has the war frame been, and continued to be, employed in news media to relate a particular understanding of the dispute? Moreover, based on this close textual analysis, I suggest that framing the dispute as a "war," in fact, undermines the efforts of stakeholders to reach a resolution on the management of the ACF river basin. This study adds to our collective understanding of the Tri-State Water War, and concludes with suggestions for a more productive discourse surrounding the dispute.

Democracy Blinded: a Study of the Afghanistan and Iraq Wars, 2001-2008
Ashley Bartlett, CURO Scholar
Dr. John Morrow, Department of History, University of Georgia

The terrorist attacks on September 11, 2001 led to the United States' invasions of Afghanistan and Iraq. While many observers are concerned with the justness and conduct of the resulting conflicts, they often ignore a far more important question—how has the "war on the terror" affected the democratic principles of the United States? What can nearly ten years of war teach the U.S. about terrorism, warfare, and its own democracy? These conflicts in Afghanistan and Iraq began a new era for the United States. Iraq has cost the United States $11 billion a month. Afghanistan has cost a total of $190 billion. In the words of John Quincy Adams, America's paranoia over the September 11 attacks made her "go abroad in search of monsters to destroy." Preemptive war, the use of mercenaries and torture such as water boarding—these previously questionable ideas and methods became household words between 2001 and 2008. Have these wars had any effect on the democracy of the United States? This thesis suggests that a sense of urgency and fear of the unknown blinded American democracy. This fear and paranoia led to the compromise of America's democratic ideals and institutions, as exemplified by the government infringing on civil liberties, Congress yielding legislative power to the President, and the United States reneging on various international treaties. By launching wars to destroy the terrorist threat and democratize an entire region of the globe, the United States may in fact be undermining democracy at home.

The Elements of Chinese Grand Strategy: Applying a New Analytical Approach
Ashley Bartlett, CURO Scholar
Dr. Brock Tessman, Department of International Affairs, University of Georgia

Uncertainty about China's long term intentions has generated anxiety among many western leaders, and has led to a deadlock among international relations scholars. Will China try to assert regional dominance in East Asia? How feasible (and advisable) is it for the United States to seek to stop or stall China's meteoric rise and maintain unquestioned hegemony? In order to adequately answer these questions, one must better understand the origins and many facets of Chinese grand strategy. Through deeper appreciation of the basic way in which a country like China develops foreign policy goals and seeks to mobilize its resources in order to achieve them, one can better analyze past decisions and be better positioned to predict future behavior. This presentation will discuss China's grand strategy from the beginning of Hu Jintao's presidency in 2002 to the present. In order to do this, I will use a new analytical approach: a model for researching grand strategy. This model uses "elements" and "principles." The elements consist of four separate categories: defense, diplomacy, resources/economics, and ideology. All four elements combined form a "principle," a specific pillar to an actor's grand strategy. Using this analysis, I determined China's grand strategic principles: international institutions, modernization, resource security, and reunification. Together, these principles form China's grand strategy: "partnership." It is through the lens of "partnership" that the United States should interpret, and react to, the wide range of foreign policy behavior that is of increasing global importance.

Differences in Functional Movement Screen Scores Between Female Soccer Players That Were Injured vs. Uninjured.

Katherine Black
Dr. Cathleen Brown, Department of Kinesiology, University of Georgia

Due to the contact nature of soccer, athletes are prone to numerous lower extremity injuries. Pre-season screenings may identify movement deficits exhibited by athletes that could be addressed with rehabilitation programs, thus reducing injury risk. Our objective was to determine if there was a significant difference between the number of lower extremity sprains sustained in female soccer players with higher functional movement screen (FMS) scores (>12) when compared with female soccer players with lower FMS scores (≤12). A score of 12 was previously established a clinically meaningful difference in performance. Members of a collegiate women's soccer team (n=31) performed and were scored on the 7 components of the FMS in the spring or summer prior to their competitive fall season by trained FMS professionals. After the season, an injury report was obtained, and 8 joint injuries were catalogued regardless of contact of non-contact nature. An injury was defined by an athlete's complaint or injury that resulted in evaluation and treatment by an athletic trainer. Using a Pearson chi square-analysis, a significant difference in observed vs. expected joint injury counts ($\chi 2 = 7.4$, $p = .0075$) was found, with players scoring ≤ 12 experiencing more sprains than expected. These results indicate that soccer players with low FMS scores were most likely to suffer a joint injury during the season. Pre-season training should focus on improving muscular strength and neuromuscular control in order to increase FMS scores, which may lead to a reduced risk of injury during the season.

Analysis of the Inter-Rater Reliability of the Functional Movement Screen

Jason Bowman, CURO Apprentice
Dr. Cathleen Brown, Department of Kinesiology, University of Georgia

The Functional Movement Screen (FMS) was recently developed to identify athletes at risk of incurring injury. It consists of 7 movements assessing strength and range of motion deficits and asymmetries on a 1-3 scale. Current research on the sensitivity, validity, and inter-rater reliability of the FMS is limited, as is the difference in reliability between "expert" and "novice" raters. The purpose of this preliminary study was to assess novice inter-rater reliability on the 7 movement tests. Six undergraduates with limited background in the FMS were taught the scoring criteria for test. Videos of 5 participants completing the FMS movements were created. The 6 student raters then scored the videos following the guidelines on 3 separate occasions, and the inter-rater reliability was assessed using the generalized kappa statistic. The deep squat, shoulder mobility, and straight leg raise tests were all found to have generalized kappa statistics indicating moderate to strong inter-rater reliability that was better than chance (Kappa = .37-.60; Standard Error (SE) = .11-.16; $p < .05$). However, the kappa statistic indicated poor reliability when scoring the hurdle step, in-line lunge, push-up and rotary stability tests where agreement was no better than chance (Kappa = .02-.46; SE = .12-.51; $p > .05$). These low agreements may be due to scoring errors made by novice raters. Additionally, the kappa statistic is reduced if 1 class category dominates the rating, as happened with these data. Future studies should increase rater training, utilize more varied performance in class categories, and possibly apply different statistical procedures.

The Political Economy of the Textile Industry in Bangladesh

Katie Branscomb
Dr. Santanu Chatterjee, Department of Economics, University of Georgia

Textiles have been Bangladesh's primary economic industry since before Bangladesh's independence in 1971. Beginning with jute production for the colonial shipping industry and transitioning to readymade garment production in recent years, fifteen million Bengalis currently depend on the textile industry for their livelihoods. In 1974, the Multi-Fibre Agreement exempted Bangladesh from the import quotas it placed on other countries. Based on the principles of the "infant-industry argument" the

special treatment was meant to give Bangladesh time to strengthen its textile industry before exposing it to the free market on January 1, 2005, when the quotas expired. The literature unambiguously finds that the import quotas were beneficial to the Bengali textile industry. The question now is whether the protections that Bangladesh enjoyed for thirty years created enough benefits to outweigh the costs that Bangladesh faces in an import quota-free world. This paper presents the consequences of removing the Multi-Fibre Agreement's import quotas for the textile industry in Bangladesh. Data analysis comes from information on economic indicators (like the trade balance and GDP), discussion of trade liberalization policies, and government's role in structural adjustment in order to determine how evolving economic actions and trade policies have impacted the Bengali textile industry and the households that depend on it for their livelihoods. As one of the world's poorest countries, Bangladesh's economy is an international concern. We must understand the economics of developing countries like Bangladesh in order to determine the best course of action that will most effectively challenge the status quo.

Genetic Analysis of Pigmentation in *Drosophila tenebrosa*

Michael Bray, CURO Summer Fellow
Dr. Kelly Dyer, Department of Genetics, University of Georgia

Pigmentation is a trait that evolves rapidly in many species of animals. An example includes the quinaria group of *Drosophila*, in which most species are yellow in body color with distinct dark spots spaced around the abdomen. The sole exception is *Drosophila tenebrosa*, which has a completely diffuse, dark melanic abdomen. In this experiment, I interbred *Drosophila tenebrosa* with a closely related yellow species, *Drosophila suboccidentalis*, looking for the genetic basis of inheritance of the melanic abdomen. I then performed backcrosses, using the F1 female hybrids crossed to each male *D. suboccidentalis* and *D. tenebrosa*, respectively. I scored and ranked the offspring based on pigmentation intensity of the dorsal abdomen. By analyzing the progeny of the F1 hybrids and F2 backcrosses, it appears that the unique pigmentation phenotype in *D. tenebrosa* is caused by two main loci, a locus on the X chromosome and a locus on an autosome. I then used a candidate gene approach to ask which genes in the pigmentation pathway are associated with dark pigmentation in *D. tenebrosa*. I found two genes, *yellow* and *ebony*, that contribute to the dark pigmentation phenotype of *D. tenebrosa*. The *yellow* marker is located on the X chromosome, and the *ebony* marker is on an autosome. These or closely linked genes appear to have an additive effect to pigmentation and together can explain the majority of the dark pigmentation phenotype. This work will ultimately help us understand how changes on the gene level affect changes on the phenotypic level.

Effects of Medial-Wedge Orthotics on Knee Frontal Plane Moments in Individuals with Valgus Knee Alignment and Lateral-Compartment Osteoarthritis

Jenny Brickman
Dr. Cathleen Brown, Department of Kinesiology, University of Georgia

Individuals with valgus knee alignment have an increased risk of developing lateral compartment knee osteoarthritis (OA), a common disease. Orthotics used to realign the foot and leg may offer a relatively inexpensive, noninvasive treatment option. Large knee joint valgus moments have been linked to lateral compartment knee osteoarthritis. The purpose of this study was to determine if valgus moments decreased in valgus-knee aligned participants with or without medial-wedge orthotics during tasks of daily living. Three participants with an average age of 61 with valgus knee alignment and self-reported lateral compartment osteoarthritis were tested using biomechanical motion analysis equipment. Knee moments in the frontal plane (maximum and minimum during the loading phase) were measured during three tasks: gait, sit to stand, and stepping down from a box. Qualitative descriptions were used to assess changes in moments. During the gait task, orthotics did not significantly change the valgus moment. In the sit to stand task, orthotics shifted the moment toward the valgus direction

by 14.9%. However, after omitting one subject's data, the results showed that orthotics were beneficial and the moment shifted toward varus by 11.4%. During the step task, orthotics decreased the valgus moment by 10.2%. These preliminary results indicate most participants experienced decreased valgus moment in each task when wearing orthotics, potentially decreasing the load on their affected knee condyle. However, the impact of orthotics on valgus moment may change on an individual basis. Further research should be done gain more accuracy and insight into individual differences.

Sex Differences in the Mechanisms Underlying Facial Expression Recognition: Effects of Cognitive Load and Facial Mimicry on Facial Expression Recognition

Lindsay Briggs
Dr. Janet Frick, Department of Psychology, University of Georgia

Humans use at least two routes for recognizing emotion: an empathetic route that involves facial expression mimicry (matching), and a cognitive route that does not involve mimicry (Stel & Knippenberg, 2008). Facial mimicry is a process in which people automatically imitate others' facial expressions. The cognitive route is a slower process which involves matching visual input with one's knowledge about emotions. Males and females may differ in which route they use (Simpson & Fragaszy, 2010). Facial mimicry may play an important role in facial expression recognition, particularly for females. The extent to which males and females differ in the cognitive route remains untested. We explored two mechanisms which may underlie sex differences in facial expression recognition: the extent to which mimicry facilitates recognition, and the amount of cognitive resources necessary for recognition. We predicted that while females use the empathetic route and mimic more than males, males more often use the cognitive route. If this is the case, females' performance (i.e., speed, accuracy) should decrease when mimicry is prevented, while males' performance should decrease when cognitive load is increased. Participants were asked to rate facial expressions. We manipulated cognitive load with a word memory task. We also manipulated the extent to which participants could mimic facial expressions by having them hold a popsicle stick between their teeth. We are currently collecting data and will present preliminary findings. This work has implications for communication between the sexes, as well as implications for those who suffer from impairments in facial expression recognition.

Black Stereotypes in Reality Television and the Reinforcement of Prejudiced Attitudes

Melissa Brown
Dr. Leonard Martin, Department of Psychology, University of Georgia

The proposed studies explore the relationship between stereotypes of Black Americans presented in reality television shows and the racial attitudes of White Americans. They also explore the possibility that this relationship is affected by White Americans' real-world and mediated exposure to diversity. The experiment begins with a content analysis of reality television shows, focusing on the presence of minority contestants in a majority cast as well as how minority contestants interact with non-minority contestants and main characters. Content analysis will highlight instances such as how duration of a minority on camera, the nature of the behavior while on camera, whether or not the behavior may be perceived as positive or negative, and how frequently these instances occur. Study 1 will survey White Americans regarding their reality television viewership and their racial attitudes. Study 2 will content analyze reality television shows to determine which specific aspects of the shows may drive overall depictions of Black Americans. It is hypothesized that the more negative stereotypes of Black Americans a show contains, the more likely it is that White Americans who possess negative racial attitudes will consider these stereotypes to be accurate portrayals. It is also hypothesized that more intergroup contact will lead to more positive racial attitudes, regardless of stereotype knowledge. Such findings will elucidate the real world effect the unreal stereotypes displayed in this type of television media has on minorities.

Nice to Have: Expression and Movement Through Film

Virginia Broyles
Ms. Bala Sarasvati, Department of Dance, University of Georgia

Nice to Have is a work I created to explore the integration of dance and film. How can film techniques and editing contribute to the expression of a choreographic idea? Traditionally, concert dance is performed onstage, and while many elements with lighting and set design are utilized, the choreographer is still somewhat limited in angles and distance from the viewer. With film this can be manipulated throughout the piece. Historically speaking, dance for camera is still a new medium, and I wanted to not only effectively present the choreography, but also use film to better fulfill the emotional content and story. The piece explores a relationship that is physically represented by fabric that ties two people together. I explored movement ideas and motifs through improvisation. Then I developed movement phrases and integrated them with the fabric, exploring the limitations and inspirations that came with using a prop. Working with film offered many options for viewing the dance choreography, but having so many options was also a challenge. Location was an important element to consider in the piece, as well as the lighting possibilities available. I planned filming to acquire a variety of shots, especially from various points of view and distances to express an intimacy that is not usually experienced when viewing a dance onstage. The next creative step was exploring how through editing of the film I could enhance the expression of the choreography and create a cohesive and interesting dance piece.

Geographies of Expression: the Arts within Space and Scale

Tyler Bugg
Dr. Amy Trauger, Department of Geography, University of Georgia

To date, inquiry into a geographical understanding of the fine arts, and of theatre arts in particular, has been largely absent. It is this silence that this research attempts to fill with staple concepts of the geography discipline. As geographical discourse is largely occupied with elements of *space* and *scale*, it becomes an applicable tool for describing the experiences to be had through the theatre arts. *Spatiality*, as geographers understand it, is fundamental to the experience of the theater. It is central to explaining the relationships between performers in productions, audiences that attend them, venues that host them, and state institutions that fund them; each player has unique spatial interactions with each of the others. Moreover, geography asserts that these interactions are situated in levels of *scale*. The full process of the theatre arts involves actors as small as the individual body of the performer and as large as the regulatory functions of state arts institutions. Interview and observational analysis of the theatre arts as both an academic discipline and a business of entertainment is at the center of this research, deriving data from the experiences of actors and directors, theater patrons and ushers, and state arts policy agencies. Geography, then, is a mediator of the interactions that make theatre the artistic outlet as we know it. As such, the experiences of the theatre arts can be viewed as *geographies of expression*, where the artistry of creative expression grows out of the geographies that give them root.

Characterization of *C. elegans* Insulin-degrading Enzyme

Mary Burriss, CURO Scholar
Dr. Walter Schmidt, Department of Biochemistry & Molecular Biology, University of Georgia

Recent research on Alzheimer's disease (AD) has focused on the amyloid hypothesis, which states that accumulation of the beta amyloid (Aβ) peptide causes neurodegeneration. The insulin-degrading enzyme (IDE) degrades insulin, Aβ, and several other biologically important peptides. If IDE activity, towards Aβ specifically, could be enhanced, the accumulation of Aβ would predictably occur at a lower rate and perhaps delay the progression of AD. The Schmidt lab has identified compounds that activate *Rn*IDE *in vitro*. For a cost efficient animal model to study IDE and its activators, I have investigated the utility of the *C. elegans*

system. In the first part of my study, I created a bacterial vector for recombinant expression of *Ce*IDE, which was purified via cobalt-sepharose column chromatography. A series of *in vitro* studies demonstrated the ability of recombinant *Ce*IDE to cleave Aβ and other substrates that are cleaved by IDE family members. Additional studies determined that *Ce*IDE is not a good target for investigations of *Rn*IDE activators due to lack of cross-specificity. In the second part of my study, *Ce*IDE was investigated using a yeast system that allows for studies of the *in vivo* specificity of IDE family members through production of the **a**-factor pheromone. I created a yeast vector that was used to express *Ce*IDE in yeast and demonstrated via genetic methods that *Ce*IDE promotes pheromone production with the same efficiency as other IDE family members. These studies reveal that *Ce*IDE has biochemical and enzymatic properties similar to mammalian IDE and other IDE family members and suggests that the *C. elegans* system can be used to study the physiological role of IDE enzymes more thoroughly, although there are limitations with respect to investigations of IDE activators.

Influences on the Outlook of the Post-College Educational Opportunities and Choices of Undergraduate Science Majors

Ebony Caldwell, CURO Summer Fellow
Dr. Monica Gaughan, Department of Health Policy & Management, University of Georgia

Women and members of some racial and ethnic groups are under-represented in the fields of science, medicine, and public health. In the field of medicine, minorities represent less than 15% of the physicians entering the workforce. This disparity is even more present in academic institutions at the faculty level, where minority representation is 5% despite the US population of minority groups being over 30%. Additionally, there are shortages of professionals from all backgrounds performing research in the sciences and practicing medicine in the United States, and these shortages are only expected to increase in the future. However, before these faculty members and professionals enter the workforce, they experience myriad influences as undergraduate students that shape their future employment and educational decisions. The study focuses on the factors that influence the intentions for post-baccalaureate studies of undergraduate students. The participants of this study are University of Georgia undergraduate science majors recruited through either a snowball sampling or a convenience sample. All data collected were gathered through semi-structured interviews with a protocol of questions that asked participants how they perceived their academic and professional futures and what factors influenced their pursuits of these plans, including themes such as race and early education. The collected data served as the basis for qualitative analytic work exploring how different social constructs, such as family, gender and ethnicity, have affected the perceptions of the opportunities and likelihood of success for the participants in the study.

Role of the Telomere Binding Protein TPP1 in Recruitment of Telomerase to Telomeres in Human Cancer Cells

Garrett Casale
Dr. Michael Terns, Department of Biochemistry & Molecular Biology, University of Georgia

Telomerase is the ribonucleoprotein responsible for lengthening telomeres at the ends of eukaryotic chromosomes. Telomeres are RNA-protein complexes that protect chromosomes from gradual degradation caused by the end replication problem. While most normal human somatic cells do not express telomerase, cancer cells have been found to possess reactivated telomerase activity. As an enzyme paramount to the survival of cancer cells yet dispensable in most adult tissues, telomerase is a promising target for future chemotherapeutic treatments. We are investigating the mechanism of recruitment of telomerase to telomeres in human cancer cells. We show here that TPP1, one of six core telomere binding proteins, is critical in telomerase recruitment to telomeres. Depletion of TPP1 expression via RNA interference inhibited telomerase recruitment to telomeres. Loss of telomerase recruitment was restored with the expression of an RNA interference-resistant form of TPP1. Furthermore, we found that the oligonucleotide-binding fold (OB-fold) domain of TPP1 is required for TPP1 to function

as a telomerase recruitment factor. These results identify and support a direct role of TPP1 in telomerase recruitment to telomeres and suggest that the OB-fold domain of TPP1 mediates the direct interaction of telomerase with telomeres.

The Art of Persuasion: How Small Business Owners Use Speech to Market Products in Roswell, GA

Caitlin Cassidy, CURO Summer Fellow
Dr. William Kretzschmar, Department of English, University of Georgia

Linguistics is a field that is not often explored within the context of marketing and business management. Rather, its study is often confined to analysis of historical languages and language acquisition, leaving little room for discoveries in the art of modern communication. My research intends to open doors to discoveries in the field of sociolinguistics, with regards to how speech can be used as a business strategy. The primary objective of this research is the identification of patterns in communication that characterize new members of the business community and allow for their success in the free market. I am looking for characteristics that help to establish credibility as an entrepreneur. I have conducted recorded interviews with three volunteers from the Roswell community who have come to Roswell from abroad and started businesses. Included in the recordings are conversations related to personal background, the decision to immigrate to Roswell, and the challenges one can expect from opening a small business. I have transcribed each of the interviews and have reviewed them in the hope of discovering specific themes. In particular, I am comparing these themes with what is already known about the speech of Roswell residents. I believe that a new understanding of the integration of international residents and their businesses will emerge and give the community of Roswell a means of improving communication between buyers and sellers, ultimately helping the local economy to continue grow and prosper.

First-Principles Investigations of Oxygen Vacancies on SnO2 Nanofilms

Daniel Cellucci, CURO Summer Fellow
Dr. Steven Lewis, Department of Physics & Astronomy, University of Georgia

The *n*-type semiconductor tin dioxide (SnO_2) has long been used as the working material for robust, inexpensive oxidizable-gas sensors. In recent years, advances in nanofabrication have made possible the well-controlled formation of SnO_2 nanocrystals. Since gas sensing in SnO_2 involves changes in surface resistivity as a function of gas concentration, nanocrystalline SnO_2 holds great promise for high-sensitivity gas sensors, due to the high surface-to-volume ratio. A key feature of the sensing mechanism is the facile formation and destruction of oxygen vacancies at (or near) the surface. In this talk I will discuss our ongoing first-principles investigations of surface oxygen vacancies in SnO_2 nanofilms. We have focused on vacancy formation among the so-called bridging oxygen atoms on the (110) surface of rutile SnO_2, as a function of vacancy concentration and film thickness, studying the effect on local atomic and electronic structure. This work is the first phase of a longer-term investigation of surface vacancy phases on SnO_2 (110) as a function of temperature and oxygen vapor pressure.

Remote Sensing as a Generative Tool in the Creation of Fine Art

Daniel Cellucci,
Dr. Ralph Brown, Lamar Dodd School of Art, University of Georgia

As defined by the National Aeronautics and Space Administration (NASA), remote sensing refers to instrument-based techniques employed in the acquisition and measurement of geographically distributed information. The author has taken the data previously gathered from such remote sensing instruments as ground penetrating radar, electromagnetic conductivity, and SONAR and now seeks to use these samples to fabricate forms that can truthfully reflect the data from which they were derived. Building upon the results of research projects presented at previous CURO symposia that involved applications of SONAR to underwater art, the

author seeks to explore new possibilities in the area of sculpture that are offered by other tools that are employed in the study of remote sensing. The aim of this research is to take the data generated from these processes and to create a series of software tools that can effectively present this information in a virtual space. The virtual works created from these tools will be made visible via a technique known as augmented reality, whereby the use of specifically equipped mobile technologies can access the work in real time. In particular, two attempts to convey this space will be presented. The first will be in an indoor piece, involving fiduciary markers that will map the work into a gallery setting and the second will involve applications of GPS and accelerometer data to geographically positioning the user in an outdoor environment. The frameworks used to accomplish this feat will be capable of expanding to additional works and allow the placement of these works in otherwise inaccessible locations.

Assessing Baseline Characteristics of Mother-Child Dyads Participating in the AFFECT (A Family Focused Emotion Communication Training) Pilot Study

Kristen Cerny & Julia Taylor
Dr. Anne Shaffer, Department of Psychology, University of Georgia

The relationships between parents and children set the groundwork for the child's future relationships as well as general wellbeing and the development of psychopathology. Parenting interventions are used when parents need assistance communicating with, disciplining and strengthening their relationships with their children. Many interventions exist that use operant learning methods to improve child behavior (Eyberg, et al., 2008). While these interventions are effective, they do not directly address children's emotional functioning. The current study is a pilot test of AFFECT (Shipman & Fitzgerald, 2005) a community-based intervention designed to bolster parents' skills in active listening, emotion coaching, and emotional support. Participants currently include 13 families; data collection is ongoing. Families participate in a pre-intervention assessment where they complete self-report measures and a structured interview. This study describes the characteristics of families who choose to enroll in AFFECT. Descriptive analysis of baseline presenting characteristics will allow us to understand the scope of the intervention and inform directions for future expansion of AFFECT. The Difficulties in Emotion Regulation Scale (DERS) and the Parenting Stress Index, Short Form (PSI-SF) will be used as measures of parental functioning. Child emotional and behavioral problems will be measured using parent report (Child Behavior Checklist) and child report (Child Depression Inventory, Multidimensional Anxiety Scale for Children). Although the current sample is too small to compare pre- and post-intervention data, it is important that an understanding of the participants' presenting characteristics is obtained to identify families who are likely to enroll in and benefit from this intervention.

U.S. Primary Care Physicians: A Dying Breed

Agni Chandora, Roosevelt @ UGA
Dr. Monica Gaughan, Department of Health Policy & Management, University of Georgia

Primary Care Physicians (PCPs) are at the forefront of medical care since they are among the first health professionals an ill individual encounters. A sizeable primary care workforce usually coincides with better health results. Currently, the U.S. has one of the lowest ratios of primary care physicians to total population in the developed world, and it has recently started to experience a decline in the percentage of medical students entering primary care. The growing and aging U.S. population needs a far larger number of primary care physicians than are projected to be produced, creating a shortage of at least 50,000 by 2020. Additionally, a PCP shortage already exists in rural areas due to an imbalanced distribution. This paper explores the future shortage and present maldistribution of primary care physicians in the U.S. and evaluates possible policy solutions to increase the provision of primary care services. Through literature and legislative reviews, background information was gathered to understand the problem, and four policy alternatives (status

quo, counseling for medical school students, increasing the use of International Medical Graduates, and expanding nurses' scope of practice) were created. Each alternative's outcome was then evaluated using the criteria of political feasibility, efficiency, and equity. The analysis suggested that expanding the scope of practice for nurse practitioners was the most favorable alternative for increasing primary care services. Finally, the challenges and implementation efforts associated with the recommendation are explained. This analysis offers the optimal solution based on the selected criteria to alleviate the PCP shortage.

The EEOC and the Federal Court of Appeals
Kathryn Clifford & Sophie Winkler
Dr. Scott Ainsworth, Department of Political Science, University of Georgia

Since the creation of the Equal Employment Opportunity Commission (EEOC) by the Civil Rights Act of 1964, the agency has been the federal government's primary means for addressing employment discrimination. Related to its mission, the EEOC has been involved in hundreds of federal Appeals Court cases from 1965 to 2000. Our purpose is to determine whether political influence affected the decision of these cases. For each case in which the EEOC was involved, data were collected on the court's decision, the nature of the three-judge panel resolving the dispute, and the state of the economy when the decision was rendered. The initial results are straightforward: the Appeals Court decide cases differently depending on the partisan and economic circumstances surrounding the cases. Under better economic conditions, panels tend to favor the EEOC, particularly when the partisan composition of the panel coincides with the party in control of the executive branch. The results show that even though the EEOC was designed to be an independent agency, it is still subject to partisan judicial review.

Perceived Barriers and Medication Adherence in Adolescents
Anastasia Couvaras
Dr. Ronald Blount, Department of Psychology, University of Georgia

The purpose of this study is to examine the relationship between perceived barriers and medication adherence for adolescents who are diagnosed with Inflammatory Bowel Disease (IBD). Barriers to adherence include unpleasant side-effects, forgetfulness, faulty organization methods, and oppositionality. It is important that these barriers be acknowledged and addressed because nonadherence to medication may lead to increased risk of mortality and morbidity. The participants in this study will be both the adolescents ranging from 11-18 years of age who have been diagnosed with IBD and their parents/caregivers. In order to determine individual barriers that need to be overcome, each parent/caregiver will complete the Parent Medication Barriers Scale (PMBS) and each adolescent will complete the Adolescent Medication Barriers Scale (AMBS) (Simons & Blount, 2007). Medication adherence will be assessed using the Medication Adherence Measure (Zelikovsky & Schast, 2008), a structured interview conducted separately with parents and adolescents to determine the extent to which adolescents adhered to their prescribed medication intake during the past week. A greater number of both parent and adolescent reported barriers will be associated with lower adolescent medication adherence. Therefore, there is a negative correlation between both parent and adolescent reported barriers and medication adherence. We will attempt to identify adolescent and parent perception of barriers that interfere with their medication adherence. By identifying barriers we can work to individualize solutions to improve medication adherence and health outcomes of adolescents with IBD.

Efficacy of Alternative and Combinatorial Drug Therapies in the Treatment of *Trypanosoma Cruzi* Infection

Byron Crowe
Dr. Rick Tarleton, Department of Cellular Biology, University of Georgia

Chagas disease, the largest infectious disease burden in Latin America, is caused by the protozoan *Trypanosoma cruzi* and affects 16 to 18 million people. An estimated 50,000 people die every year due to infection, which chronically persists undetected for many years in the host. Benznidazole (BZ), the principle drug available for the treatment of *T. cruzi* infection, has largely unknown efficacy and substantial side effects. Importantly, the side effects are believed to increase with cumulative dosage. Benznidazole is usually administered for 30 to 60 days in humans, and we have recently developed several model systems, including a forty day consecutive treatment protocol, that allow for the detection of parasitological cure in mice. Posaconazole (POS), an experimental anti-fungal compound, has also demonstrated activity against *T. cruzi* with markedly lower toxicity compared to BZ. In this work, we asked if less frequent treatment with BZ and POS might be equally effective at curing *T. cruzi* infection in mice as compared to the standard 40 day BZ treatments. While 40 day treatments of POS or BZ show similar efficacy, shorter regimens using just POS were much less effective than identical treatments with BZ. Surprisingly, results suggest that treatment with POS for five consecutive days followed by seven doses of BZ at 5 day intervals was more effective at curing the infection than the same regimen with only BZ. These results suggest that treatments involving less frequent and thus less potentially toxic treatments may be effective in humans.

Friends of Convenience

Robert Daniel
Dr. Michelle vanDellen, Department of Psychology, University of Georgia

Research indicates actual rejection and fear of possible rejection decreases a person's ability to exert self-control. This decrease coupled with a desire to be in social groups creates an environment where people may join groups without commonalities. The purpose of this study is to measure the innate desire people possess for groups and how rejection affects that desire. We recruited participants from the research pool at the University of Georgia to participate in a study designed to measure people's desire to be in groups and the effect social rejection has on people seeking group membership. Four people were placed in a room with each other and completed a measure of personality purportedly so that we could test a software program that forms people into groups based on similarities. While the software was running, people completed an online ball toss game where they were rejected or included by others. The results were then shared on an individual basis and participants told the software didn't place them in a group. The participants were then asked if they would like to join the group regardless of having few commonalities with the group or work alone. Results show that people desire to be in groups. The inclusive nature along with the rejection manipulation showed a decrease in self-control. These factors work in conjunction to produce groups with identities distant from our actual values, which has implications for people's satisfaction with relationships and for how peoples' identities are formed within the context of group membership.

A Culture Identified by Canines: How Dogs Have Become an Integral Part of the American Public Self

Alyson Dankner
Dr. Kaitlin Medvedev, Department of Textiles, Merchandise & Interiors, University of Georgia

In contemporary society, people surround themselves with material objects to fit in or stand out and have begun to use pets, especially dogs, as a means of self-identification. Today, dogs are often dressed like people, treated like children, and have better nutrition and healthcare than some humans. People are using dogs to improve their physical and mental health, enlarge their social circle and even attract members of the opposite sex. In this process dogs have become the new "accessory" of humans; they are dressed to complement their

owners' personal style and project their most important character traits. This paper will discuss this phenomenon and will show that an entire industry was created to pamper and decorate dogs, possibly making them the most versatile and expensive accessory ever. To arrive at my conclusions I have explored the history of the relationship between human and canines, studied the presence of dogs in literature, and read accounts about America's "First Dogs" in the White House. My study will first discuss the commercialization of the historical bond between humans and their canine companions by investigating the emergence of the dog fashion industry. Next, I will demonstrate that the items with which people choose to adorn their canine pets reflects the owners' personal interests and desires and conveys their social status and aspirations. I will show that in a society compelled to judge a book by its cover, we routinely make assumptions about a person's lifestyle, persona, and social status based on their dogs.

Where the Pavement Ends: An Evaluation of the Urban Heat Island Effect in Metropolitan Atlanta

Malin Dartnell, Roosevelt @ UGA
Dr. Jenna Jambeck, Department of Biological & Agricultural Engineering, University of Georgia

High concentrations of dark, impervious surfaces in urban areas can cause environmental problems (e.g., stormwater run-off and heat transfer) and generate high costs (e.g., through management of stormwater and excessive heat) for cities and their residents. One problem related to urban infrastructure is the Urban Heat Island Effect, a phenomenon of increased average temperatures in cities compared to surrounding rural areas. The Urban Heat Island Effect augments energy demand during the summer, reduces the air quality of the city, and can cause heat-related health problems and changes in local climate patterns. Many individuals and businesses lack the incentive or means to combat the Urban Heat Island Effect alone; therefore, an overall strategy is needed for an urban center. This study evaluates three broad strategies from the literature for combating the Urban Heat Island Effect for the city of Atlanta, Georgia (where the Urban Heat Island Effect has been documented to be a problem). It begins with an introduction to some of the most effective mitigation strategies, before evaluating three options: 1) maintaining the status quo, 2) increasing the albedo of surfaces in the city, and 3) utilizing a combination of vegetation and high-albedo surfaces. Using a decision matrix, each strategy is examined for its effectiveness, feasibility (including relative costs), and efficiency, then ranked to recommend a strategy for Atlanta. Results of the study found that requiring high-albedo pavement is a reasonable strategy for Atlanta in order to increase the albedo of the city to reduce the Urban Heat Island Effect.

Intron Loss and Gain in the Br2/Dw3 Gene Across Grass Subfamilies

Victoria DeLeo
Dr. Katrien Devos, Department of Crop & Soil Sciences, University of Georgia

Documentation of intron loss and gain in conserved genes provides insight into the mechanism of genome evolution across organisms. This is a relatively unexplored area in plants. Studies in *Arabidopsis* and rice, two species that diverged around 150-200 million years ago, have shown differential presence for about 5% of introns, mostly due to intron loss. This study will look in particular at the orthologs of a highly conserved gene that codes for a p-glycoprotein involved in auxin transport. This gene, known as Br2 in maize and Dw3 in sorghum, has mutated forms that reduce the height of a plant by reducing the length of its internodes. Comparison of the sequence of the recently isolated gene in pearl millet with the orthologous gene sequences from maize and rice has shown evidence of at least two independent intron gain or loss events in the evolution of this gene in the three species. We have designed primers in conserved exons of the gene and are using those to amplify the introns in selected members of four grass subfamilies. Sequencing of the introns and intron-exon boundaries may provide insight into the mechanism of intron gain and loss. We aim to explore the evolutionary history of this gene in the grass

family and identify which grass has the most ancestral form of the gene.

Effects of N-Acetylglucosaminyltransferase Expression Levels on Colorectal Adenoma Progression

Sarah-Bianca Dolisca
Dr. Michael Pierce, Department of Biochemistry & Molecular Biology, University of Georgia

Colorectal cancer is currently the third most prevalent form of cancer. Adenomatous polyposis coli (APC) gene mutations are attributed to multiple intestinal neoplasia (Min) within $APC^{Min/+}$ mouse models. The expression of this genotype results in progression of colorectal adenoma ,a precursor to colorectal cancer. N-Acetylglucosaminotransferase V (GnT-V) is a glycoprotein whose functional role is the biosynthesis of N-linked glycans. GnT-V is associated with metastatic potential. $APC^{Min/+}$ mouse models with varying levels of GnT-V expression were used to investigate regulation of colorectal cancer formation and progression. Antibody and lectin blotting experiments were conducted on the colorectal tumors of the $APC^{Min/+}$ mice to identify glycan and signaling pathway changes. Results supported findings that downregulation of GnT-V in $APC^{Min/+}$ mice significantly inhibited progression of colorectal adenomas. The molecular mechanism that allows the knockdown of GnT-V to significantly decrease the progression of colorectal adenoma provides a potential preventative method of treatment of colorectal cancer.

A Sensitive Approach in Evaluating the PBP (Penicillin Binding Protein) Binding Specificity of Penicillins Using Activity Based Protein Profiling

Vinh Dong, CURO Apprentice
Dr. Timothy Long, Department of Pharmaceutical & Biomedical Sciences, University of Georgia

This study synthesized and evaluated a novel beta-lactam probe that tests for the inhibition of certain penicillin binding proteins (PBPs) in different bacteria. Previously, beta-lactams with radioactive or fluorescent tags were used to label and visualize active PBPs in membrane preparations. However, these methods were time consuming, hazardous, or inefficient because either the tags they use are radioactive, or that they attach a large fluorescent dye to the core scaffold, reducing both target affinity and cell permeability important for *in vivo* studies. Contrary to prior methods, the probe used in this study is nonradioactive, and utilizes a simple fluorescent dye, such as rhodamine and dansyl, attached to azidocillin core scaffold that bypasses these complications. Additionally, once the azidocillin is attached to the interested PBP, the dye reacts only with the PBP that has that scaffold. Thus, the assay development using this new probe is important because it provides the sensitivity and target specificity necessary to discover new, unknown targets of beta lactams for the development of new antibiotics.

The Use of Twitter by University of Georgia Student Organizations and Their Members

Eric Ekwueme, CURO Apprentice
Dr. Brenda Cude, Department of Family & Consumer Sciences, University of Georgia

The internet is constantly changing; websites are quick fads that go in and out of style within a few years. A new social network site called Twitter is based on the premise of micro-blogging short messages about anything a person can think of. Twitter is slowly becoming a very powerful tool in the business world because of its advertising potential, but it seems to be lacking the same power on college campuses. This research studied usage of Twitter by the University of Georgia's student organizations and the undergraduate population. This study's central focus was the effectiveness of Twitter for student organizations and their members. To conduct this research, I selected 10 student organizations and contacted their presidents/ public relations chairs for interviews. During the interview, we discussed the reasons their organizations did or did not use Twitter and if they did, how Twitter was used. I then sent an online survey to a convenience sample of UGA's undergraduate population recruited via Facebook, Twitter, listservs, and word of mouth. The questions focused on students' Twitter use, why some decided to get an account while others did not, if the students were following

student organizations, and overall opinions on Twitter and student organizations using the site. Through this study, I hope to get an idea about how prevalent Twitter is on UGA's campus in regard to student organizations. I also want to identify ways student organizations could use Twitter to reach their desired audience.

Delegates' Personal Interests and Their Influence on the Crafting of Congressional Qualifications at the Constitutional Convention

Khalil Farah
Dr. Keith Dougherty, Department of Political Science, University of Georgia

The paper seeks to determine what level of self-interest the founders exhibited during their framing of the U.S. Constitution. My hypothesis holds that the founders voted with respect to their future political ambitions when deciding who was eligible to run for national office. To evaluate this claim I look at the coded votes of delegates at the Constitutional Convention and compare individual votes to a delegate's economic standing. My research confirmed that no delegate distinctly voted to bar himself from being eligible to run for public office. This exhibits a degree of self-interest on the part of the framers of the Constitution. These finding are relevant to the current debate that has arisen over the place of the Founding Fathers in modern judicial interpretations of the Constitution. The theories of "original intent" and "original interpretation" exhibit deference to the founders as more noble than the people of the present. Showing that, to some degree, self-interest motivated the founders brings into question the views of some justices, like Anthony Scalia, who use the founders as justification for their rulings. No previous study has taken the founders' political aspirations as an explanation for their votes.

Luche Reduction

Jessica Fazio, CURO Summer Fellow
Dr. Richard Hubbard, Department of Chemistry, University of Georgia

The organic chemistry laboratory manual has become outdated and, thus, should have a makeover. It is important to move away from a "cookbook" approach of the procedure to a more investigative approach by the students through the addition of several unknowns. Moreover, reduction of the times spent for the reactions to take place should be reduced in order to implement more time for hands-on instrumental analyses. The addition of the Luche reduction experiment does both of these. By using different terpines such as carvone, menthone, and pulegone with different solvents like methanol and different ratios of methanol with water, varying percentages of diasteriomer products are yielded. The experiment is carried, out by mixing and using the distillation method with the microscale glassware. The end product is then used in the polarimeter to get the optical rotation reading. Depending on the initial products used, the students will receive different readings for their optical rotation and then be able to calculate the absolute optical rotation of their product. This is an introduction to a new instrumental technique that will be used in the labs. The menthone has so far shown positive results. It has yielded a 18:82 neomenthol to isomenthol product which was solved after having a +34 degree rotation of the polarimeter. The expected ratio was to be 21:79, so the experimental results were very close to this. This shows good signs of advancing toward adding this experiment into the organic lab manual.

Traditional Textiles Through a Modern Lens

Christine Fekete
Prof. Jennifer Crenshaw, Lamar Dodd School of Art, University of Georgia

The tradition of textile making is rooted in repetitive processes. Some traditional fabric methods that employ a repetitive process are loom weaving, knitting, wool felting, embroidery, and screen printing. The intention of my art is to manipulate fabric through the use of technology to create a new textile surface. My recent projects explore the use of the repeating module stitched together to create a single surface. An important part of my process is transforming the material I start with, transparent cotton fabric, into something new. My method involves painting yards of this fabric with glue and allowing it to dry. This treatment

stiffens the fabric, making it suitable to be cut cleanly into any shape. I then use a laser cutter to cut multiples of the same shape out of the treated fabric, which I then arrange and stitch into a large panel. Each of these steps is repeated until the finished panel is the right size. The process I have invented is far from traditional but keeps intact the repetitive nature of traditional textile making. Even though the finished textile is intended to be displayed in a gallery setting, it could also be used for the construction of high fashion garments or in interior design as a room divider or window covering.

Mineral Probes of Magmatic Processes at Valles Caldera, Northern New Mexico

Emily First
Dr. Michael Roden, Department of Geology, University of Georgia

The Ma Valles caldera and its volcanic products have played a central role in our understanding of catastrophic, caldera-forming eruptions. We are using mineral compositions determined on the UGA JEOL microprobe in an attempt to understand processes in the magma chamber(s) responsible for the caldera-forming eruptions and ensuing post-caldera eruptions. Specifically, we are using compositions (S, F, Cl and by calculation OH) of the phosphate mineral apatite to infer evolution of magmatic volatiles from before until after the caldera-forming eruptions. We expect to see evidence of significant degassing in post-caldera units, indicated by apatite with low Cl, S and OH. This would imply eruption from the same magma chamber as the caldera-forming units. However, if more recent units show an increase in volatile content, this could indicate the intrusion of new magma and the potential for dangerous eruptions in the future. Preliminary findings show that apatite in one post-caldera unit, the South Mountain rhyolite, is fluorapatite (~3.5 wt% F, ~0.1 wt% Cl), consistent with eruption from a previously degassed magma chamber. An initial microprobe survey of the groundmass of the Bandelier tuff, the caldera-forming unit, indicates that apatite, if present, is rare and small. These findings are not unexpected, given the very low reported phosphorus concentrations for this tuff, which are likely due to apatite fractionation prior to eruption. The abundant apatite we find in the groundmass of more recent eruptions (e.g., Banco Bonito) suggests that these later units came from a new or recharged magma chamber.

Do Black-furred Animals Compensate for High Solar Absorption with Smaller Hairs? A Test with a Polymorphic Squirrel Species

Melanie Fratto
Dr. Andrew Davis, Odum School of Ecology, University of Georgia

In polymorphic mammalian species with multiple color forms, those with dark pelage are more prone to overheating, especially in warm climates, because their fur absorbs solar energy at a higher rate. However, studies indicate that physical properties of their fur prevent or minimize heat stress, although it is unclear which properties. We tested the possibility that black-furred individuals simply have shorter or thinner hairs, creating a lighter (in weight) coat or one that allows greater airflow for evaporative cooling. We examined museum specimens of eastern fox squirrels (*Sciurus niger*), a species that displays brown, grey or all-black pelage color, and used image analysis to quantify hairs from the dorsal surface and tail. From examination of 43 specimens (19 brown, 9 black and 15 grey), and 1,720 hairs, we found no significant difference in hair lengths across color morph, but significant differences in hair widths. Black squirrels had thinner body hairs than other forms (7% thinner), but thicker tail hairs (9% thicker). Given that the dorsal surface would be directly exposed to solar radiation, we interpret this as an adaptation to prevent heat stress during the day. Thicker tail hairs may be an adaptation for nighttime thermoregulation, since squirrels sleep with their tails wrapped around their bodies. These results add to a growing literature body of the functional significance of mammalian pelage.

The Message Behind the Music: Blind Tom's Response to Nineteenth-Century Views on Race

JoyEllen Freeman, CURO Apprentice, CURO Summer Fellow
Dr. Barbara McCaskill, Department of English, University of Georgia

Today, the name "Blind Tom" possesses little or no meaning for most Americans. Just one hundred years ago, however, its mere mention would have excited people across the country. Thomas Wiggins (1849-1908), popularly known as Blind Tom, was a black musical prodigy born blind, autistic, and enslaved near Columbus, Georgia. Most scholars have shied away from exploring Tom's perspectives on race and race relations because they do not believe that he had an extensive understanding of social life. As to be expected, many of Tom's original compositions do seemingly avoid or acquiesce to nineteenth-century American attitudes towards race. However, drawing from archival newspapers, sheet music, eugenics literature, books on slave resistance, and conversations with experts, I found that he demonstrates an awareness of and protest against racial limitations because many of his later pieces resemble the work of Frederic Chopin (1810-1849). Chopin was known to use his works to evoke emotion and assert the independence of his homeland, Poland, from Russian tyranny. My findings reveal that Tom and Chopin had similar musical and biographical experiences. I argue that Tom may have drawn from the works of this composer to advocate freedom from the racial boundaries that attempted to confine him as an African American musician. Looking at Tom's life through his music is important because it reveals the hardships and expectations that African American artists faced during the nineteenth century due to racism, and it provides insight into the racial struggles that contemporary artists still encounter today.

The Biogeochemistry of Hammock Groundwater

Ashleigh Gainer
Dr. Samantha Joye, Department of Marine Sciences, University of Georgia

Hammock groundwater research, a component of the Georgia Coastal Ecosystems Long Term Ecological Research on Sapelo Island, is investigating the possible effects human development has on hammocks off the coast of Georgia. A hammock is an upland area between the mainland and a larger barrier island. Hammocks are popular locations for homes or vacation spots and therefore, can be greatly affected by development. Two undeveloped hammocks (HN_i_1 and PC_i_29) of similar size and vegetation zones were used to investigate hammock groundwater biogeochemistry in a natural environment. At both sites, groundwater wells are located at different land areas including the marsh, upland, and hammock. Samples were also collected from a local creek. Groundwater samples were analyzed and compiled with relevant data from previous years. The salinity, chloride, and sulfate concentrations at both sites were higher in the creek and marsh well locations in comparison to the upland and hammock locations. This is due to the inflow of seawater. The phosphate and ammonium concentrations were much higher in the marsh and upland wells at site HN_i_1 in comparison to site PC_i_29. The higher concentration of phosphate at site HN_i_1 may be related to the Holocene era from which the hammock originated. Understanding the biogeochemistry of the groundwater at these natural hammocks will give a means of comparison for developed hammocks in future research.

Ready for Disaster

Smitha Ganeshan, Roosevelt @ UGA
Dr. David Williams, Honors Program, University of Georgia

In the past decade, the oil industry and regulatory body, the Bureau of Ocean Energy Management, Regulation and Enforcement, has conducted three surprise inspections and eight emergency drills. These emergency drills are the

only chance for oil companies to practice and rehearse emergency preparedness plans. Without follow-up inspections or guidelines to mandate the BOEMRE's recommendations, the incentive to maintain an evolving, ready-to-mobilize emergency preparedness plan is low and the risk of disaster remains high. Further, relationships between industry regulators and oil companies compromise the standards of evaluations. An extensive literature review coupled with a cost/benefit, timeline, and impact analysis led to the selection of a particular policy alternative from a list of five other viable options, which would allow oil companies to augment the perceived importance of emergency preparedness and risk mitigation. Through this policy alternative, each company will achieve a culture of risk mitigation and emergency preparedness by overseeing standardized quarterly emergency drills and regular self-inspection. The portfolio of each company's reports will be evaluated during rigorous, unannounced inspections and follow-up evaluations by the BOEMRE. This is the most effective way to affect the oil industry's underlying culture that shapes risk mitigation behaviors and emergency preparedness initiatives. This policy alternative will ensure that a disaster like the Deepwater Horizon oil spill will not occur again and, in the event of a crisis, that the oil industry will be well prepared to respond to the crisis.

Studying Human Seizures Using Zebrafish as a Model

John Gaudet
Dr. James Lauderdale, Department of Cellular Biology, University of Georgia

In humans, an epileptic seizure is marked by a sudden, stereotyped increase of brain activity. The increase in activity is due to the uncontrollable discharge of many neurons and results in involuntary contractions of random muscle groups, and sometimes a loss of consciousness. The underlying basis for seizure disorders is largely unknown, and is difficult to study in humans. We hypothesize that zebrafish (*Danio rerio*) exhibit human-like seizures and can therefore be used as a comparatively simple vertebrate model to study these neurological events. To compare seizures in zebrafish to those in humans, adult zebrafish were treated with a common chemiconvulsant (pentylenetetrazole, PTZ) and observed for both behavioral and electrophysiological symptoms of seizures. It was found that zebrafish swimming in a PTZ solution experienced violent, uncontrolled muscle spasms, and in a 10 mM solution or greater, all fish (n = 79) went catatonic. Also, preliminary electrophysiological recordings reveal that the neuroelectrical patterns in seizing zebrafish are comparable to the stereotyped patterns in humans. This data provides evidence that perhaps the adult zebrafish central nervous system is sophisticated enough to produce human-like seizures and is therefore of merit to study. Future goals of this research include studying the molecular and cellular basis for epileptic seizures and using zebrafish as a screen for anti-epileptic medication.

Representations of Children and Childhood in Jurek Becker's Holocaust Novel *Jakob der Lügner*

Isha Ghodke
Dr. Martin Kagel, Department of Germanic & Slavic Studies, University of Georgia

Jurek Becker is an East German novelist who survived a childhood divided between a Polish ghetto and German concentration camps. His 1969 novel *Jakob der Lügner* features an 8-year-old named Lina who secretly lives with the main character, Jakob. Children are seldom examined in the context of the Holocaust or its literary representation because those younger than 16 were not allowed to work in Auschwitz and those who could not work were killed. Young children often dictated the fate of their mothers because children represented a future that the Nazis aimed to eliminate. Focusing on the depiction of children such as Lina is significant, because it provides insight into the development of a generation that was responsible for raising itself during the Holocaust and that was so often caught between the blurred lines of childhood and adulthood. Specifically, the focus sheds light on the early years of today's survivors, as most were children during the Holocaust. I anticipate that Lina's role as a child will be

ambiguous, and characteristics representing a childlike state, such as gullibility, will instead be apparent within the adults of the ghetto. The purpose of this study is to examine Becker's use of storytelling as a theme in the novel through the interchange of childlike characteristics by analyzing the conflicting depictions of childhood and adulthood between Lina and the adults surrounding her.

Stability Analysis of the Inhibitor Resistant Phenotype of AJP50 in Biomass Fermentations

Debashis Ghose, CURO Summer Fellow
Dr. Joy Doran Peterson, Department of Microbiology, University of Georgia

The United States' dependence on foreign oil has increased demand for alternative fuels. Switching to biofuels would also lessen human contribution to greenhouse gases since emissions produced when the fuel is burned would be offset by the carbon sequestered in growing new feedstock. Lignocellulosic biomass, such as pine wood, can be fermented into fuel ethanol by a biocatalytic organism, such as *Saccharomyces cerevisiae*. Therefore, adapting *S. cerevisiae* to the harsh conditions found in biomass fermentations is vital to biofuel production. Strain XR122N was adapted by continuous fermentation of pretreated pine wood to yield strain AJP50. It has been previously shown that AJP50 will produce more ethanol and grow more rapidly than XR122N in pine wood fermentations. The present study used a Bioscreen C machine to create growth curves for both strains in various media. AJP50 was able to grow more rapidly and produce more ethanol than XR122N in all media examined. To determine if AJP50 retained its inhibitor resistant phenotype, the strain was cultured on solid and liquid YPD media for 48 hours. Growth curves were created to compare the growth of the newly cultured cells to the freezer-stock AJP50. Approximately 62% of the fresh culture maintained the same level of resistance as freezer-stock while other times they reverted to the parent phenotype, indicating the resistant phenotype is not completely stable. Developing culture techniques that will allow AJP50 to retain its phenotype would aid in study of the strain's genetics, allowing for the creation of strains with advanced fermentation capabilities.

How Effective Are "Fuzzies" as a Tool for Developing a Holistic Understanding of Basic Genetic Principles?

Erica Gibson
Dr. Eve Wurtele, Department of Genetics, Development & Cell Biology, Iowa State University of Science and Technology

When learning genetics, high-school students often develop misconceptions about concepts being taught. For example, students often develop a shallow understanding of inheritance and its underlying factors. As a solution, we chose to create an enjoyable way for students to develop a holistic understanding of basic genetics concepts. This study measured the effectiveness of using an educational game to teach these concepts. Effectiveness was measured by player satisfaction based on survey results and inter-rater reliability on player's recorded facial expressions during play. We also measured effectiveness by how much the player learned, which was based on pre- and post-test scores. The game was developed through an iterative design process in which the educational objectives remained the same but level of player interaction differed. Two game prototypes were developed in the process. One group of students played the first game prototype, while another group played the second. In both games, the objective is to breed and grow simple organisms called "Fuzzies" so that their color and pattern match that of a goal pattern. The main difference between the two versions was the level of interaction allowed. Players were able to interact with the process of meiosis in one prototype whereas the process was automatically carried out in the other prototype. We expected that a higher level of player interaction would increase the difference between pre- and post-test scores. Due to a small sample size the results were not significant. More extensive studies will reveal whether a holistic understanding was developed.

Sensory Systems in *Drosophila* Courtship
Erin Giglio
Dr. Kelly Dyer, Department of Genetics, University of Georgia

All species use distinctive courtship patterns to identify mates of the same species. These patterns may involve stereotyped motions, pheromonal excretions, visual displays, or combinations of all three. The purpose of this project is to examine the sensory systems used in courtship behavior by two closely-related *Drosophila* species. *D. recens* and *D. subquinaria* are two species which do not mate with one another in the wild. It is possible that they avoid intercrossing by using different sensory systems during courtship, such as wing-based song, pheromonal smells, or visual displays. Alternatively, the two species may avoid crossbreeding with one another by using the same sensory system, particularly in populations where both species are present but using different forms of display within each system. To test which of these hypotheses was correct, I performed a series of individual crosses to identify the emphasis on each sensory system within each species. Flies from *D. recens* and two populations of *D. subquinaria* will be studied—one population living alongside *D. recens* and one population which does not share territory with *D. recens*. Within each population, the mating successes of flies for three sensory system losses will be assessed: those without wings, those without antennae, and those without vision. Finally, I will look at the gender-based differentiation of these categories by surveying the differences between courtship success with different combinations of intact or altered males with intact or altered females. Thus, I will measure the importance of these systems on courtship success.

An Analysis and Application of Foreign Language Education Methodology
Mary Golden
Dr. Victoria Hasko, Department of Language & Literacy Education, University of Georgia

This paper practically examines methodology used in past and present foreign language classrooms. This paper first includes a critical review of several major methodologies used in foreign language classrooms, including the Grammar Translation Method and the Communicative Approach in attempt to understand why each method continues to be or is not longer popularly used today. These methods, especially the Communicative Method, are compared with the ACTFL Standards. The writer also examines various Spanish textbooks to see which methods are manifested by the manner in which the textbooks are written. Furthermore, the writer discusses an observation of the "communicative" classroom of a high school Spanish teacher. The paper then shows an application of the most effective methods, especially the Communicative Approach, by giving examples of two lesson plans. The thesis includes a discussion of the results of the lesson plans after they were implemented in a high school Spanish classroom. Through this application, the paper seeks to analyze and practically apply foreign language education methodology to aid in creating more effective lessons for foreign language students.

Investigation of the Protein Content of Hirano Bodies
Camille Gregory, CURO Summer Fellow
Dr. Marcus Fechheimer, Department of Cell Biology, University of Georgia

Hirano bodies are actin-rich, highly structured protein aggregates found in the hippocampus of patients with many neurodegenerative diseases, including Alzheimer's disease. The role of Hirano bodies in disease progression is largely unknown due to the lack of *in vivo* models. Previous studies of autopsied brain samples have shown that some proteins tend to appear in the same location as Hirano bodies. Mislocation of these proteins within Hirano bodies could be beneficial or harmful to the cells during neurodegeneration depending on the protein, the protein's normal function, and the protein's alternate function in disease. In cultured cells, Hirano bodies have been shown to reduce AICD-dependent apoptosis. Further investigation of Hirano bodies could provide clues to their physiological function. Previous experiments have purified Hirano bodies and used mass spectrometry to determine which

proteins co-localize to the formations in *dictyostelium*, a slime mold model organism. These data provide evidence as to which proteins could be associated with Hirano bodies and potentially explains how these structures are interacting in the cell and affecting neurodegeneration. Using immunofluorescent staining, I prove conclusively that certain proteins co-localize with Hirano bodies in dicyostelium. These experiments clarify the previous purification work by corroborating the mass spectroscopy data. The association of these proteins with Hirano bodies provides an indication of their role in disease and leads to further inquiries into their functional impact.

Screening for Domestic Violence in Divorce Mediation

Camille Gregory, Roosevelt @ UGA
Prof. Raye Rawls, The Fanning Institute, University of Georgia

Domestic violence affects the divorce process in significant ways depending on the type of controlling behavior exhibited between the couple. The most important consideration in divorce cases affected by domestic violence is the protection of victims from further harm; therefore, it is critical for the arbiters of divorce disputes to understand the power dynamics involved in the relationship. Mediators in the state of Georgia do not uniformly receive specialized training to recognize domestic violence, nor do they all learn how to assess the degree of coercive control exhibited by a divorcee over his or her partner. Policy does not align with significant changes in the study of intimate partner violence in the last decade. Analysis of the state's current system in conjunction with a review of new intimate violence assessment techniques reveals promising areas for improvement. Several alternatives to the current system, including maintaining the status quo, the elimination of mediation, the use of the DOVE screening process, the use of the Controlling Behaviors Scale, or the creation of a new coercive control measure, were evaluated based on three criteria: effectiveness, feasibility, and cost. The results of this analysis in conjunction with detailed literature review reveal that the reform of the mediation process must include changes in mediator training procedures. Assessments of the degree of coercive control between divorcing couples using the Controlling Behaviors Scale ought to become standard procedure for mediators. With the results of such assessments, mediators will be able to make informed decisions about how to handle each case.

Telomere Recombination in Wild Type Yeast Cells

Zijing Guo
Dr. Michael McEachern, Department of Genetics, University of Georgia

Telomeres are protective caps at chromosome ends that are composed of short tandem repeats. Their function has been tied to carcinogenesis and aging in humans. Most cancer cells maintain telomeres by using telomerase, while somatic cells have little or no telomerase activity. However, cells lacking telomerase, including a subset of human cancers, can sometimes elongate telomeres by utilizing homologous recombination. Previous research has shown that telomeres in wild type yeast cells can sometimes be recombined. This was shown by their ability to become extended by copying sequence from a transformed telomeric circle; however, it was not possible to tell if the recombined telomeres were normal length or abnormally shortened when they were recombined. Our goal was to construct and use mutationally tagged telomeric circles to distinguish whether telomeres in wild type cells have normal length or shortened length at the moment of recombination. First, telomeric circles containing phenotypically silent Bcl mutant telomeric repeats (that each contains a *Bcl*I restriction site) and a *URA3* gene were constructed. Next, these circles were transfected into *URA3*-deficient *Kluyveromyces lactis* mutant cells and only the cells with *URA3* are able to grow. The telomere structures in these transformants will be analyzed using the southern blot technique in order to see if wild type length telomeres are recombined with the telomeric circles. This study is significant in the way that it could help us understand the situations in which normally functioning telomeres can recombine.

Bedouin Dress: A Means of Cultural Continuity and Change

Shelly Hagigi
Dr. Katalin Medvedev, Department of Textiles, Merchandising & Interiors, University of Georgia

Dress plays a crucial role in people's lives; therefore, in today's globalized world it is important to understand the multiple uses and meanings of people's dress practices in cultures other than ours. The way people dress depends on their personality, lifestyle, political beliefs, and the physical environment that surrounds them, among other factors. This paper investigates the changing aesthetics and the complex cultural and gendered meanings of contemporary Bedouin dress in Israel's Negev Desert. With the aid of academic and visual sources, as well as field research that included participant observation, a visit to Joe Alon Center's Museum for Bedouin Culture, and communication with Bedouin women, I have concluded that dress is a key element of the Bedouin culture. The Bedouins live in a patriarchal and collectivist society. Bedouin women's highly decorated yet non-revealing garments indicate a strong tribal identity and emphasis on the Islamic virtues of honor and modesty. In addition, their dress projects their marital and social status, conveys their personal aesthetics and sophistication of manual skills. The Bedouins' layered dress styles also aid their physical survival as their garments are specifically designed to withstand the extreme climate changes of the desert. Just like other cultural and ethnic groups, today the Bedouins are also affected by modernization, which is changing their traditional lifestyle and appearance. This study contributes to the existing studies on Bedouin dress the documentation of the recent changes in the dress practices of this intriguing nomadic culture and provides reasons for this change.

Without Anchors: Standardizing Child Placement after Deportation

Christen Hammock, Roosevelt @ UGA
Dr. Larry Nackerud, School of Social Work, University of Georgia

United States immigration policy essentially consists of two comprehensive bills passed in 1996—the Illegal Immigration and Immigrant Responsibility Act and the Anti-terrorism and Effective Death Penalty Act. These bills do not effectively address the issues of "mixed-status families," those in which two members of the same family hold different immigration statuses. This demographic is particularly problematic in Georgia, whose immigrant population increased 372% between 1990 and 2006. When immigrants living in Georgia establish families, their children are citizens by birthright. Their welfare is therefore Georgia's responsibility. Additionally, they are not eligible for removal, while their parents still remain deportable according to federal law. When removal of a parent occurs, the opposing goals of federal immigration court and state family policy cause de facto deportation of citizen children or an increase in foster care placement. Both result in a burden on Georgia's agencies and taxpayers. This paper's research consists of examining the failures of and gaps in current legislative and judicial code, as well as a review of other states' approaches to this problem. This paper intends to provide solutions for filling this gap in policy, evaluate the solutions according to relevant criteria, and ultimately argue for the creation of a liaison department within Georgia's Department of Family and Child Services to ensure that the best interests of the child are met in every case of removal.

Spatial and Temporal Analysis of the Ceramics at the Burnt Village, 9TP9

Vanessa Hanvey, CURO Scholar
Dr. J. Mark Williams, Department of Anthropology, University of Georgia

The Burnt Village, also known as Okfuskenena, is located three miles west of present day LaGrange, Georgia. On September 21, 1793, white colonists burnt this Creek town and either killed or kidnapped the inhabitants.

Harold Huscher of The University of Georgia excavated the site during the field seasons of 1966-69. No final report was published and much of the collection has not been analyzed. Over the past year and a half, I have analyzed the ceramics and lithics from the Burnt Village. The pottery analysis allowed for the identification of several occupational periods at the site. These periods include the Middle Woodland, Middle Mississippian, Late Mississippian, and Historic periods. Using the mapping program Surfer, I will attempt to identify the geographical distribution of these differing occupational time periods. I will present the latest findings concerning spatial and temporal analysis of this data.

Creating the Physician of the Future: Addressing the Health Needs of Rural Georgia Communities

Osama Hashmi, Roosevelt @ UGA
Dr. Monica Gaughan, Department of Health Policy & Management, University of Georgia

The Georgia State Office of Rural Health states that rural Georgians are less healthy than those living in urban areas, are more likely to be uninsured, and have a higher probability of developing heart disease, obesity, diabetes, and cancer. Studies show that health care workers in these communities must be prepared to treat these patients holistically by overcoming physical, cultural, and social barriers. In response to this need for holistic medical education, medical schools must be better equipped to prepare their students to handle community health problems. In addition, rural Georgians are faced with an extreme shortage of Georgia medical students who choose to become primary care physicians. These physicians are essential for the detection and prevention of illnesses and are necessary to the well-being of high risk, rural communities. This paper proposes that Georgia implement a community health rotation program, available to Georgia medical students and health professionals. A cost benefit analysis of cost, feasibility, and effectiveness of Georgia's present resources indicates that a community health rotation program has the greatest potential for improving the quality of rural health care. Current rotation programs in other states offer health care students first-hand experience in caring for patients in disadvantaged communities. By exposing medical students to the rewarding field of community health, a community health rotation program in Georgia has the potential to increase the number of students entering primary care as well as improve the overall quality of rural health care.

The Boom That Saved the Day

Anisha Hegde, Roosevelt @ UGA
Dr. Leara Rhodes, Grady College of Journalism & Mass Communications, University of Georgia

Emergency preparedness—including efficient oil clean up—was lacking in the aftermath of the Deepwater Horizon oil spill. To fix this shortfall, oil companies should be required to formulate efficient emergency plans, and the Bureau of Ocean Energy Management, Regulation, and Enforcement (BOEMRE) should be required to inspect each rig's capability to carry out its plan. Currently, the BOEMRE does not inspect emergency plans and each rig is expected to monitor its own response capabilities. However, literature reviews confirm that the Deepwater Horizon did not possess the fire boom it claimed to have on-site. Experts predict that immediate usage of booms would have restricted the spill to 100 miles offshore, preventing 211,680,000 gallons of oil leaked from reaching the coast. Despite a 10-day delay in boom usage, 125 burns conducted using booms had destroyed 2.8 million gallons of oil by June. A shortage of boats and clean-up crews was also evident. The Coast Guard needed 14 boats equipped to burn oil, but officials were only able to contract 8 boats. 20 skimmers were needed to collect oil on days with waves higher than 3 feet, but only 2 were on fully on-duty. The National Oceanic and Atmospheric Administration (NOAA) also reported a shortage of crews, which should have numbered 40 by June. If each oil company detailed a plan with an economical response toolkit—complete with manpower, booms, and boats—and the BOEMRE inspected each rig's capability to carry out its plan, future oil-related disasters could be contained more expediently.

Medical Therapies and Clinical Characteristics among Patients with Duchenne Muscular Dystrophy

Anisha Hegde
Dr. Michael Terns, Department of Biochemistry & Molecular Biology, University of Georgia

Duchenne Muscular Dystropy is the most common fatal genetic disease diagnosed during childhood. Over the last four years, the DuchenneConnect Registry, a resource connecting the DMD community, has collected data from 1,273 participants to better characterize patients and educate others. In this study, analysis of the data regarding steroid and therapy usage as well as behavior and learning concerns was performed by comparing usage and diagnosis frequencies to the clinical histories of respondents. This study found that a significantly higher percentage of patients who need walking aids use corticosteroids than those who can walk without assistance and that deflazacort, a drug not yet available in the U.S.A, is used almost twice as frequently as prednisone in boys who require walking aids. Heightened levels of autism, ADHD, and OCD were found in the DMD population when compared to the general population, and the incidence of behavioral concern diagnoses was found to increase in the later stages of the disorder. Therapy usage also increases as the disorder progresses. Analysis of therapy usage amongst DMD patients, however, exhibits no correlation indicating the effectiveness (measured in prevention of heart, bone, muscle, and tendon problems) of various therapies. 12.42% of those who have never tried any therapy have experienced broken bones related to the muscular dystrophy, versus 12.46% of those who have tried therapy. The findings ciphered from DuchenneConnect will help bridge the gap in knowledge between laboratory research and public health concerns of the DMD population.

John Lloyd Stephens and Mesoamerican Orientalism

James Herman
Dr. John Short, Department of History, University of Georgia

Published in 1841, John Lloyd Stephens's *Incidents of Travel in Central America, Chiapas, and Yucatán* introduced American readers to the previously "undiscovered" Mayan civilization. In addition to his writings on Mesoamerica, he also documented his travels in Eastern Europe, Egypt, and the Levant. Stephens, however, has remained largely forgotten by historians and literary critics alike. The portrait that emerges from the little scholarship that does exist suggests that his travel writings, particularly those on Mesoamerica, were the product of the American Romantic Imagination and, in the spirit of Manifest Destiny, treated Mesoamerica as a blank canvas on which to express American colonial ambitions. The aim of my research, however, is to contest this claim. Long before he had set foot in the Yucatán, Stephens traveled extensively throughout the Orient, and in engaging the unexplored world of Mesoamerica, Stephens borrowed language definitive of European travel literature about the Orient. It was not the Romantic Imagination, renowned for its celebration of originality, which informed Stephens's discovery. It was, instead, the European tradition of presenting the Orient, through the use of both Oriental imagery and language, as a timeless and unchanging entity. A close analysis of his writings suggests a subtle transposition of these images over the Yucatán. Aside from the fact that virtually no scholarship exists on this important work, the significance of my research is that it sheds light on the historical evolution of American language of the exotic as well as the long-term structuring of American perceptions of the foreign.

Directed Differentiation of Human Embryonic Stem Cells to Mesoderm Lineages

Daniel Hess, CURO-BHSI Participant
Dr. Stephen Dalton and Dr. David Reynolds, Department of Biochemistry & Molecular Biology, University of Georgia

During early development, complex signaling from surrounding embryonic structures patterns cells as they pass through the primitive streak into the various mesoderm lineages including paraxial, intermediate and lateral plate mesoderm. Lateral plate mesoderm further divides into splanchnic and somatic mesoderm. The various mesoderm progenitors give rise to specific tissues of the human body. We sought to mimic the natural environment and elucidate the differentiation pathways of these mesoderm progenitors using an *in vitro* human pluripotent stem cell model. These mesoderm progenitors give rise to skeletal muscle, somites, kidneys, gonads, heart, and bone. Successful differentiation of human embryonic stem cells (hESCs) to any of these cell types has therapeutic potential for treating a wide variety of current diseases, such as muscular dystrophy, renal failure, heart disease and osteoporosis. hESCs were grown in chemically defined media containing an assortment of factors known to play a role in differentiation such as Activins, Wnts, BMPs and retinoic acid. Differentiated cells were analyzed by qPCR and immunofluorescence for markers of the various mesoderm progenitors. Initial data indicates differentiation of hESCs to paraxial mesoderm, evidenced by upregulation of Pax3 and Pax7. Preliminary data also demonstrates differentiation from lateral plate mesoderm (Brachyury+) to both splanchnic mesoderm (Foxf1+) and somatic mesoderm (Irx3+). Further experiments are necessary to show differentiation of hESCs to intermediate mesoderm and to more fully characterize the different mesoderm progenitors and their potential.

Exercising Glycoprotemics to Develop New Methodologies for the Detection of Early Breast Cancer

Shanterian Hester, CURO Summer Fellow
Dr. Michael Pierce, Department of Biochemistry & Molecular Biology, University of Georgia

Breast cancer is the second leading cause of cancer deaths among women, discovery of new biomarkers would enhance current methods used for diagnostics, monitoring and better prediction disease reoccurrence. Identifying Glycosylphosphatidylinositol (GPI) anchored proteins through new methodologies and technologies on breast tissue could lead to the discovery of new biomarkers for the early detection of breast cancer. GPI anchored proteins is a posttranslational modification that anchors the modified protein to the outer cell membrane. The synthesis of GPI anchored proteins requires approximately 20 enzymes, one of them being GPI transamidase (GPIT), which adds the GPI anchor to the C-terminus of the protein. Preliminary studies have shown GPIT is over-expressed significantly in breast cancer. In addition, GPI-PLD, another enzyme with the responsibility of cleaving GPI anchored proteins, was found at high levels in human serums and shown to be expressed at elevated levels in several cancer cell lines. This suggests that GPI anchored proteins may be increased in breast cancer patients due to elevations of the enzymes within the GPI biosynthetic pathway. In our study, we are utilizing glycoproteomics analyses and various methodologies to identify potential GPI anchored proteins specifically to breast cancer patients.

Risk-taking in Midterm Elections

Dana Higgins
Dr. Charles Bullock, Department of Political Science, University of Georgia

Since 1934, the president's party has lost seats in the House of Representatives in every midterm election with only two exceptions. With such a strong empirical trend in favor of the challenging party, more challengers to the party in control should strategically choose to run for the House in midterm election years. Thus far, research has focused solely on why the midterm

loss occurs and ignored the effect such a trend has on candidate emergence. This research seeks to establish a trend of challengers in midterm elections using previously established theories explaining the behavior of candidates. Candidate's behavior will be evaluated in context of the midterm election when empirically the president's party loses House seats. Data collected from both midterm and presidential year elections for the United States House of Representatives will be analyzed in a district-level test of the following hypotheses: 1) more districts held by the president's party are less safe in midterm elections than presidential year elections, 2) the average number of risk-takers, from a party other than that of the incumbent president, running for election is higher in midterm years compared to presidential election years, and 3) the average number of experienced risk-takers, from a party other than that of the incumbent president, running for election is higher in midterm election years than presidential election years.

Isolation and Characterization of Polyomavirus Middle T (PyVT) Mammary Cancer Stem/Progenitor Cells

Jessica Holmes, CURO Scholar
Dr. Michael Pierce, Department of Biochemistry & Molecular Biology, University of Georgia

Transgenic mice carrying Polyomavirus middle T (PyVT) antigen are commonly used models to study mammary tumorigenesis and metastasis, and are valuable tools to analyze the molecular and cellular mechanisms of breast cancer induction and progression. The biomarkers expressed in PyVT-induced tumors exhibit similar morphologic and histologic properties to that of human breast cancers, and are associated with a poor prognosis. Recent studies also indicate that mammary tumorigenesis may arise from the mammary stem-like cells which are found in higher concentrations in PyVT-induced mammary tumors. Effective identification and characterization of such mammary stem cells in PyVT-induced tumors can provide valuable diagnostic tools and subsequent treatment methods for human breast cancer. The focus of my research is to obtain, culture, and characterize key biomarkers present on mammary cancer stem cells using tumors obtained from PyVT transgenic mice. My experiments involved setting up appropriate mating and genotyping of the mice using DNA extraction, Polymerase Chain Reaction (PCR), and gel electrophoresis to identify mice carrying the PyVT antigen. After obtaining PyVT mice, I isolated tumor cells and collected mammary cancer stem cells from tumor tissues by flow cytometry using stem cell marker antigen. By understanding more about mammary cancer stem cells, researchers can begin to characterize important molecular biomarkers, proteins, and signaling pathways which can lead to aggressive diagnostic and treatment strategies for human breast cancer.

Symbolization and Religious Thought

Dillon Horne, CURO Scholar
Thomas Cerbu, Department of Comparative Literature, University of Georgia

Competing interpretations on the reason for the origins of religious thought attempt to reduce this analysis to one variable. However, this field is irreducibly complex. For that reason, an interdisciplinary perspective can link different inqueries into a cohesive structure. These connections will emphasis evolutionary biology, theology, and epistemology. This paper draws upon a range of journal articles and books in an effort to provide a more holistic picture of current ideas. Specifically, it will focus upon the evolution of symbolization in religious thought framed within an adaptationist perspective. Religion not only improved social structures, but personal belief systems too. Current research supports that in our prehistory the human mind attributed ethereal influence to ambiguous events. This demand for explanatory causation, where x always points to and clarifies y, reveals an infatuation with coherence that implies the human mind finds necessity in space free of chance. Evolutionary biology indicates that as our ancestors physically developed so too did their capacity for abstract thought. Communal relationality, and its preference towards inclusiveness, evolved beyond human to human contact. The human mind, at some point along the evolutionary timeline, began to struggle with questions of meaning and belonging. Relations

transcended localized and immediate concerns by moving into the realm of the non-corporal. The symbol was born. The implications of this thesis impact important questions on issues of human uniqueness and meaning, as well as provide a more complete idea on the origins of religious thought.

Thwarting Radiological Terrorism: Policies for Regulating the Security of High-Risk Radioactive Sources

Lauren Howard, Roosevelt @ UGA
Dr. Dmitriy Nikonov, Center for International Trade & Security, University of Georgia

The September 11th terrorist attacks heightened international concerns regarding the security of specialized sources containing radioactive material, as extremist groups such as al Qaeda have made known their desire to use dirty bombs designed to disperse radioactive material in an act of radiological terrorism. The Nuclear Regulatory Commission's (NRC) current licensing mechanism fails to prevent wide variation in the physical protection systems which safeguard these sources because responsibility for maintaining security is broadly dispersed. Implementation of an adequate physical protection system is entirely the responsibility of the licensee in the majority of cases, and requirements for implementation are only general. As a result, the status quo is unsustainable in that the current requirements for accountability of radioactive materials do not reflect the threat level associated with radiological terrorism. This paper evaluates policy alternatives for regulating the security of high-risk radioactive sources in the United States. Three alternatives are compared to the status quo in terms of enhanced safety and security, cost-effectiveness, equity, and political feasibility. Projected outcomes for each alternative are based on a review of the existing literature, and when recommending a policy, the criteria most influential in mitigating the threat of a terrorist attack involving a dirty bomb and enhancing national security are weighted. This selection methodology advises Congress to amend current legislation and incorporate the alternative under which the NRC mandates all persons or companies to have installed an adequate physical protection system prior to being granted a license for housing radioactive materials.

The American Obesity Epidemic: Creating Incentives for Nutritional Choices at the Point of Purchase

Tiffany Hu, Roosevelt @ UGA
Dr. Angela Fertig, Department of Public Administration & Policy, University of Georgia

Obesity rates among adults and children in the United States have doubled to 30% and 17% respectively over the past 25 years. A major contributor to this trend is increased snacking, particularly of foods and drinks with a high sugar content, rather than larger meal sizes. This paper examines policy alternatives to reduce the consumption of high calorie, unhealthy drinks. The following criteria were used to evaluate the alternatives: positive impact on American diets, minimization of social costs, efficiency, political feasibility, and ease of implementation. Based on these criteria, a federal excise penny per ounce tax on caloric sweetened beverages was found to most effectively reduce sugar intake and reverse current obesity rates. Thirty-three states already have soda sales taxes in effect. Their ineffectiveness to lower consumers' BMIs, however, appears to lie in the current magnitude, ranging between 1.5% and 7%, and the application of the tax. In particular, the current state taxes are applied after the point-of-purchase and thus only weakly affect consumers' beverage purchases. A heftier penny per ounce tax applied at the point-of-purchase would raise the price of beverages such as soda by 15% to 20%. Reports by the Economic Research Service of the United States Department of Agriculture (USDA) suggest that this price change would reduce soda consumption and lower rates of obesity in the U.S. substantially. The tax would also generate revenue for potential use in public health initiatives.

Effects of Steel and Aluminum Shoes on Forelimb Action in Stock Horses

Elodie Huguet
Dr. Kylee Duberstein, Department of Animal & Dairy Science, University of Georgia

Horseshoes of various materials have been adopted to satisfy the need of performance horses. Steel shoes are commonly used for their affordability and longevity; however, the use of aluminum horseshoes is being appropriated to the various requirements of equestrian activities, such as accentuating foreleg action for ameliorated movements. Consequently, the purpose of this study is to assess the effect of steel and aluminum shoes on forelimb kinematics of trotted horses. The objective is to determine which shoeing type allows for improved quality of gaits in order to increase performance in its various aspects. By performing two repeated measures crossover study on nine healthy stock-type horses, the effects of these two horseshoe types on forelimb kinematics were analyzed at the trot. Horses were trotted in hand for three repetitions over a distance of 50 meters every other week for two shoeing cycles. Video footage was then analyzed using gait analysis software (OnTrack Equine^{TM}) for each repetition. A preliminary six week study showed a trend towards increasing knee angle in horses wearing aluminum shoes versus steel shoes. A secondary study was conducted with more controlled marker placement and extended shoeing cycles by two weeks to allow for additional recording and data. The results obtained were analogous to the preliminary study in that there was a significant treatment effect with horses wearing aluminum shoes having a larger knee angle than horses in steel shoes ($p<0.5$). This finding is of particular importance to performance horse disciplines for which ameliorated knee action is desirable.

Microplasma Ion Ablation by Electrostatic Sampling Device for SERS Sensing

Whitney Ingram
Dr. Yiping Zhao, Department of Physics & Astronomy, University of Georgia

Raman spectroscopy involves the change in the frequency of a photon to determine the molecular identity of a particle. However, Raman spectroscopy is inefficient for commercial use due to its limited detection ability. Surface enhanced Raman spectroscopy (SERS) based on metallic nanostructures, enhances the signal of a normal Raman spectrum by order of $10^8 – 10^{10}$ magnitude. Our lab uses silver coated nanostructures fabricated by oblique angle deposition. For SERS enhanced substrates, they have demonstrated excellent sensitivity for virus detection. It is our purpose to further increase the effectiveness of the SERS substrates by using an electrostatic device (ESD). An ESD is a small light-weight device, which uses a sharp pointed probe and high voltage to produce corona discharge. The discharge from the probe will produce ions that will ablate the surface of the SERS substrate. Our hypothesis is that this method will increase the signal to noise ratio of the SERS signal by removing the contaminants from the SERS surface. To observe enhancement of SERS signal, the sample will be contained in a glovebox purged with Argon, with the ESD device discharging directly onto the substrate. 2mL of BPE (trans- (bis) pyridyl-ethene) will be observed before and after exposure to the ESD on a glass substrate. Finally, a Raman spectrometer will be placed directly over the location of discharge. If the ESD shows enhancement of the signal of BPE, then the device will prove to be an effective tool for identification and detection of particulates such as viruses and TNT.

Development of a Plasmid to Detect Cobalamin Transport Mutants in *Mycobacterium tuberculosis*

Elena James, CURO Apprentice
Dr. Russell Karls, Department of Infectious Diseases, University of Georgia

Tuberculosis, a disease resulting from infection by the bacterium *Mycobacterium tuberculosis*, kills approximately 2 million people annually. Vitamin B12 is a cofactor in various *M. tuberculosis* enzymatic reactions. Although the mechanism is not known, recent research has shown that this pathogen utilizes vitamin B12 when added to culture medium. As a result, vitamin B12 transport proteins may serve as

useful targets for the development of drugs that block uptake of the vitamin. In bacteria, riboswitches are RNA structures that block translation upon binding of a specific molecule. In *M. tuberculosis*, two vitamin B12 riboswitches have been identified. My project is to develop a genetic screen for vitamin B12 transport mutants in mycobacteria. Thus far, I have been working to create a plasmid that places a drug-resistance gene under the control of a B12 riboswitch. This plasmid, which can replicate in mycobacteria and in *E. coli*, is being modified by addition of DNA elements in the following order: a transcription terminator, the promoter and B12 riboswitch for the *M. tuberculosis metE* gene, a promoter-less resistance gene for the antibiotic apromycin, and a promoter-less counter-selectable gene, *sacB*. We hypothesize that this plasmid will confer to mycobacteria resistance to apromycin only when vitamin B12 is added to culture medium. If this system functions as anticipated, the next step will be to perform transposon mutagenesis to mutate the bacteria and select for vitamin B12 transport mutants.

Security Contractors: The Future of Peacekeeping?
Archil Japaridze
Dr. Fred Manget, School of Law, University of Georgia

The objectives of this research are to assess the current and potential impact of Private Security Contractors (PSCs) on combat and peacekeeping operations. The research question addresses if PSCs would be able to effectively replace international peacekeeping forces (UN, NATO, AU). The private security industry is an increasingly growing field, one which serves a critical role in the War Against Terror. Although many contractors fulfill support and administrative tasks, a large amount serve in combat operations. These combat operations will be the topic of the research. The research will cover two aspects. The primary aspect will examine PSC combat operations throughout the course of modern warfare. This history-oriented portion will focus on operations in post-colonial Africa. This section will evaluate the efficacy of PSCs as peacekeeping forces. In addition to analyzing PSC efficacy, the research will scrutinize international peacekeeping operations. By studying these two entities (UN peacekeepers and PSCs) the researcher will examine the feasibility, advantages and disadvantages to fielding PSCs in peacekeeping operations. The second portion will focus on the future of PSCs, especially on their potential role as peacekeeping forces. Traditional peacekeeping forces have historically come up short in many conflicts. The research will address the reasons for this shortfall, and in turn advocate for replacement. Due to the increased professionalism and training of PSC forces, the researcher anticipates that PSCs would be able to readily replace traditional forces.

***Plasmodium falciparum*: Expression of the DBL3x region of VAR2CSA**
Rachel Johnson, CURO Apprentice
Dr. David Peterson, Department of Infectious Diseases, University of Georgia

Infection by the parasite *Plasmodium falciparum* causes nearly 200 million cases of malaria annually. Pregnancy Associated Malaria (PAM), often resulting in fetal and/or maternal complications, is caused by the binding of parasite infected erythrocytes to chondroitin sulfate A found in the placenta of pregnant women. We are particularly concerned with VAR2CSA, a member of the Duffy-binding like (DBL) protein superfamily, which has previously been shown to mediate the binding of parasite to host. In this project, the DBL3x domain of the VAR2CSA protein was cloned into E.coli cells and expressed for protein binding studies. The DBL3x portion of the var2csa gene was amplified from blood samples from Kenya using PCR methods. The amplified inserts were then purified, cut, and ligated into a PET-28 expression vector. The ligation product was transferred into chemically competent cells using heat shock protocol. The presence of the insert-carrying PET-28 vector was confirmed using PCR colony analysis and again by restriction digests. The VAR2CSA protein was expressed and purified in these cells. We are now using this protein to study the binding of *Plasmodium falciparum* to chondroitin sulfate A in the placenta. Understanding the binding

properties of VAR2CSA to the placenta may lead to a vaccine and the prevention of PAM.

Renewable Energy-Powered Bulk Milk Cooling for Smallholder Dairy Farmers
Jonathan Jones
Dr. William Kisaalita, Department of Biological & Agricultural Engineering, University of Georgia

Uganda's population is approximately 30.7 million, 85.2 percent in rural agricultural areas. Agriculture makes up 15.1 percent of the country's total GDP and 90 percent of its exports, with dairy production commanding a large portion of the country's livelihood. Due to poor road networks, insufficient labor, and lack of electricity, many smallholder dairy farmers lack the means to preserve or refrigerate night milk, which results in large economic losses. Previous studies by the Uganda Industrial Research Institute and the Kisaalita Lab at the University of Georgia have shown success in developing a 15.5-liter renewable energy-powered zeolite absorption evaporative cooler that lowers the temperature of milk 18° C, allowing farmers to preserve night milk. In previous field trials, the 15.5-liter capacity was found limiting. The purpose of the current project is to scale-up the cooler to approximately 100-liter capacity. With a larger capacity, the system can be easily diffused among the more educated dairy farmers with more milk, which will increase the adoption of both the technology. The use of the these innovations will permit more milk from smallholder dairy farmers to enter cold chain, facilitating increased incomes and overall increase of GDP of Uganda. The device will also potentially allow farmers to use excess biogas for cooking and lighting, decreasing the demand for woody biomass, which will reduce the deforestation rate, and reduce the release of methane gas from fermenting cow dung, which is a 21 times more potent as a greenhouse gas in comparison to carbon dioxide.

Worse Before it Gets Better? Or Just Worse?
Meredith Jones, Roosevelt @ UGA
Dr. Santanu Chatterjee, Department of Economics, University of Georgia

In 1993, the Treaty of Rome established the European Economic Community. In order to protect against encroachments on national sovereignty, article 296 detailed that the customs union would not be extended to the defense industry. However, in 2009, EU Member States introduced a directive that would drastically reduce barriers to military and defense trade in an effort to allow European military supply companies to become competitive with other world suppliers. This decision was obviously made due to economic reasons. Legally, it conflicts with the Treaty of Rome. More broadly, it contradicts the supposed wish of Member States to keep their defense departments national. This decision speaks to Member States' priorities: economics, then politics. Thus two questions are raised: Firstly, will this progressive step towards economic integration outweigh such woes as debt crises and a euro that is rapidly losing value or will it just make a mild improvement in a system that is doomed to fail? Secondly, what impact on political integration and loss of national sovereignty will the introduction of this directive have? A simple cost-benefit analysis of the directive will show that it does indeed have economic benefits. Most of these benefits, of course, occur in the defense industry, though other industries are positively affected as well. It is unclear whether these benefits will "outweigh" the European Union's other problems, though further integration seems inevitable and unaffected by predictions of success or failure. This paper will also analyze look at the political ramifications of defense industry integration.

Children's Directional Understanding of Arrows
Ryan Jordan
Dr. Janet Frick, Department of Psychology, University of Georgia

Endogenous orienting is the phenomena through which attention is cued by a "meaningful"

stimulus toward a peripheral target. Previous studies have examined endogenous orienting through arrow cues in adults and in children. Children as young as five years of age are capable of using the directional meaning of the arrow to cue their attention to the target. However, children younger than five years of age seem to rely more on the perceptual properties of the arrow, such as size or weight, to orient their attention. The manner in which 3- to 4-year-olds' abilities (to recognize arrows as symbols indicating direction) were tested may not reflect their true understanding. Therefore, the current study will extend previous findings by using 3-to 4-year-old children to test the hypothesis that children as young as three years of age are capable of understanding arrows as a directional symbol. In order to determine that children are cued by the direction of the arrow and not other perceptual properties of the arrow (such as weight) only arrow heads and arrows with arrow heads on both sides will be presented. Children are presented with a computerized reaction time task. Participants are first cued by a central arrow, followed by a peripheral target that is either congruent or incongruent with the direction of the arrow. The child's task is to press a spacebar key as soon as the target appears. Speed and accuracy will be analyzed as a function of age. This work has important implications for understanding the development of cognitive processes, and more specifically, language development.

Characterization of Disease Causing Mutations of hENT3

Ah Hyun Jun
Dr. Dr. Rajgopal Govindarajan, Department of Pharmaceutical & Biomedical Science, University of Georgia

Human equilibrative nucleoside transporter (ENT)-3 is one of the three members of the ENT family, also known as the Solute Carrier 29 family, that facilitative movement of nucleosides across cellular membranes for salvage synthesis of nucleic acids. Unlike the other members of the family (hENT1 and hENT2), hENT3 alone exhibits pH-dependent transport characteristics, with its maximal activity observed at an acidic pH level between 5.5 and 6.5. hENT3 is also unique in that it is localized intracellularly in the mitochondria and lysosomes and is thought to facilitate physiological roles of these organelles, although direct evidence supporting this conclusion is not available. In our previous studies, we have identified mutations in hENT3 that cause human disorders such as H and Pigmented Hypertrichosis Insulin-dependent Diabetes Mellitus (PHID) syndromes and shown that these mutations can affect transport properties, cellular localization, and stability of the protein. Emerging studies suggest that there are several additional genetic disorders (e.g. Familial histiocytosis, Rosai-Dorfman Disease) that are caused by mutations in other regions of hENT3. In my proposed honors thesis project, I will functionally and biochemically characterize all known clinically-relevant mutations of hENT3 linked to genetic disorders in humans utilizing cellular and molecular techniques. Specifically, I will use site-directed mutagenesis and Xenopus-based uptake studies to create mutants and study their effect on transport and cellular localization. These studies will enhance our understanding of hENT3's structure-function relationship as well as its role in health and disease states.

Y-Linked Variation and Senescence in *Drosophila melanogaster*: Starvation Resistance

Pranav Kaushish
Dr. Daniel Promislow, Department of Genetics, University of Georgia

The Y chromosome is generally regarded as possessing primarily male sex-determining genes in most organisms. In 2008, however, researchers found that the Y chromosome in the fruit fly, *Drosophila melanogaster*, actually houses polymorphic regions that affect expression of both X-linked and autosomal genes. Among these influenced genes were ones that affect many important cellular processes that could be linked to aging. Previous studies on the genetics of aging have not considered Y-linked genes. Given that Y-linked variation exists, it is therefore possible that genes on the Y chromosome may contribute to longevity in natural populations. Research has shown that stress resistance can be used as a proxy for

lifespan. Here, we assayed starvation resistance in two groups of flies that varied in the Y chromosome but were otherwise genetically identical. The flies were derived from two distinct populations, including Raleigh, North Carolina, and a region in Africa. Females possess two X chromosomes and do not have a Y, so they served as the control group. Survival analyses using the logrank and Cox proportional hazards models were performed along with analyses of variance to determine if the lines had significantly different mortality rates from one another. Ultimately, only one set of male lines showed significantly different longevity, but one group of female lines also displayed variability, suggesting that the experiment must be replicated before accurate conclusions can be drawn.

Extracting Power from Vehicle Induced Airstreams on Expressways

Miles Keeney-Ritchie
Dr. John Schramski, Department of Biological & Agricultural Engineering, University of Georgia

Diversifying our energy production infrastructure is now a priority with global energy demand rapidly increasing, and fossil fuel price volatility. This process entails researching every known source of extractable energy. To this end, this research identifies the sources and characteristics as well as determines the viability of capturing the airstreams generated by vehicles on expressways from the strategic placement of wind turbines. First, we conducted case studies of common vehicles with known drag coefficients to develop the theoretical maximum extractable power transferred to the air from moving vehicles. These analyses indicate consumer vehicles should dissipate 14 kW to 29 kW per vehicle indicating sizeable available energy on major highways with high traffic flow rates. In the second stage of this research we constructed a computer model of the fluid flows around a vehicle to refine our estimate of the energy transferred to the air and the characteristics of the ensuing airstream vortices. This allowed us to typify the directions, velocities, turbulence, and duration of vehicle induced wind at possible locations for wind turbines.

Comparing the Effects of the Ras Inhibitor Manumycin A with Novel Ras Converting Enzyme 1 Inhibitors

Song Kue
Dr. Shelley Hooks, Department of Pharmaceutical & Biomedical Science, University of Georgia

Ras is a small GTPase protein involved in receptor mediated signal transduction pathways such as the Mitogen Activated Protein Kinase (MAPK) pathway that can elicit cell growth, differentiation, and survival. The proper subcellular localization and biological activity of Ras is dependent on post translational lipid modification which occurs in four steps: isoprenylation, proteolysis, methylation, and palmitoylation. Upregulation of Ras can lead to uncontrollable growth and cancer; therefore enzymes involved in lipid modification of Ras, such as farnesyltransferase (FT) and Ras converting enzyme 1 (Rce1), are potential targets for chemotherapeutic agents. In this study, novel compounds (C1, C4, C9) previously screened for anti-Rce1 activity in yeast were compared to a validated FT inhibitor, Manumycin A, in human cancer cells for their ability to inhibit Ras dependent MAPK phosphorylation. SKOV3 ovarian cancer cells were treated with Manumycin A and the novel Rce1 inhibitors in the presence of serum. We used Western blot analysis to determine the inhibition of MAPK phosphorylation using the known pharmaceutical inhibitor Manumycin A and the novel compounds. Compounds C1 and C4 had no apparent inhibitory activity, suggesting that Ras is fully functional. However, the compound C9 was able to inhibit MAPK phosphorylation. Ongoing experiments will be done if the effects are specific, and to determine the effect of this compound on overall cell viability and toxicity. In conclusion, these novel Rce1 inhibitors pave the way for developing novel chemotherapeutic agents targeting Ras.

A Salient Issue of Today and Tomorrow: Biotechnology and Research Face Peach State Politics

Justin Leef
Dr. Charles Bullock, Department of Political Science, University of Georgia

Researchers and businesses associated with Georgia's biotechnology field represent considerable economic and educational forces today. Experiencing more than 40% growth in the past decade, this industry is poised to build upon its 21,000 jobs and roughly $961 million in wages for Georgians. Record partisanship within the General Assembly and statewide offices combined with extreme ideological oppositions from small portions of the electorate stand to possibly stunt future biotech and research growth. Legislative indifference stands to weaken the industry in Georgia as much as outright opposition. Interviews conducted with politicians, researchers and administrators from universities, private companies, business entrepreneurs, and individuals in the popular press believe that Georgia must embrace ideological moderation concurrent with political support and positive legislation. Objective analysis of the biotech industry's current status within the state is needed in order to determine how to enhance its strengths and correct areas of weakness. A synthesis of this knowledge with a detailed evaluation of how other states have successfully grown their own biotech industries and research facilities will prove vital. The Peach State has overcome resistance to the installation of industry, facilitation of higher education, and racial desegregation within the last century. Just as political leaders of the state's past worked together to galvanize an embrace of progress, so too must they in the future by facilitating the growth of Georgia's biotech industries and research organizations.

An Analysis of Two Great Russian Poets and a Discussion of Their Ties to Russia's History and its People

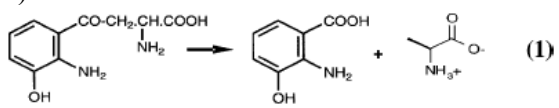
Anna Legostaev, CURO Scholar
Dr. Elena Krasnostchekova, Department of Germanic & Slavic Languages, University of Georgia

A Russian czar, Nicholas I, once called Alexander Pushkin the most intelligent man in all of Russia. Alexander Pushkin lived in the nineteenth century, and during his short thirty-eight years of life, wrote the most beloved poetry in Russian history. However, it was not simply love for Pushkin's poetry that drove the Czar of Russia to personally censor his work. Alexander Pushkin had his own political agenda, and was quick to pass an unfavorable judgment about the state of the political system. Pushkin was very closely associated with the Decembrist Revolt, a famous uprising plot of the noblemen to abolish serfdom. By examining his more radical poems such as "Ode to Liberty", I hope to show Pushkin's connection to the political and social turmoil of his time period. The somewhat ambiguous relationship between the Czar and the poet also sheds light on the degree of power Pushkin wielded with his pen. Ultimately, it was Pushkin's involvement with the intrigues of the high society of Russia, which led to his untimely death in a duel.

Kynureninase and Its Affect on Late Onset Diseases

Asaph Levy
Dr. Robert Phillips, Department of Chemistry, University of Georgia

Kynureninase is a part of the aspartate aminotransferase superfamily, which is dependent on pyridoxal 5'-phosphate (PLP). Mammalian kynureninase catalyzes the hydrolytic cleavage of 3-hydroxy-$_L$-kynurenine to 3-hydroxyanthranilic acid and $_L$-alanine (eq 1).



(1)

We have worked closely with the enzyme after isolating it from a human cell by first testing for enzyme activity in our buffered solution, as well

as after purifying our enzyme after running it through a Ni-CAM (Sigma) resin column. Purified kynureninase showed acceptable enzyme kinetics which indicated a successful yield of enzyme. Plasmids have been isolated for use as a vector to replicate our desired sequence by PCR. We are currently studying the effects of the N-Terminus on the Kynureninase enzyme. Bacteria have an N-Terminus whereas humans, and other upper level eukaryotes, do not. This is important because Kynureninase is a key enzyme in the Kynurenine pathway, which degrades most of our dietary tryptophan. This pathway's genes are expressed in immune system cells; with the main metabolite produced being Quinolinic Acid (QA). Excessive QA in CNS tissues, due to overstimulation of the Kynurenine pathway, is thought to contribute to many neurodegenerative diseases such as: Alzheimer's, Stroke, Epilepsy, and Huntington's disease. If we can test the affects of the N-terminus on the bacterial Kynureninase, we should be able to clone human Kynureninase with N-Termini and develop a cure/preventative agent for these diseases.

Polysialylation Changes During Human Stem Cell Development

David Liddle
Dr. Michael Pierce, Department of Biochemistry & Molecular Biology, University of Georgia

Embryonic stem cells (ESCs) possess pluripotency, the ability to develop into any type of cell, and this renders them ideal tools for prevention and treatment of diseases. Previous research has shown that polysialic acid (PSA), a polymerized glycan, may be involved with the mechanism of stem cell differentiation. PSA shows high expression in developed cells, but is absent in ESCs. This trend is analogous to the expression of PSA in neural precursor cells which are also undergoing differentiation. PSA contains a polyanionic charge that may regulate stem cell migration and subsequent differentiation through electrostatic repulsion forces. The first goal of our research was to elucidate the protein to which PSA attaches in developing stem cells. This was accomplished by comparing ESCs and developed stem cells using immunoblotting after SDS-PAGE. The results showed that the neural cell adhesion molecule (NCAM) is the PSA acceptor in developed stem cells. The second goal of our research was to investigate the function of PSA. Small interfering RNA was used to knockout the gene for the polysialyltransferase PST (ST8SiaIV), the enzyme that binds PSA to NCAM. Through recombinant technology, a plasmid with the siRNA gene was transfected into human ESC samples. Then the growth factors BMP and WNT were added to induce differentiation. Future results will reveal whether knocking out PSA blocks stem cell differentiation, thus indicating whether PSA plays an integral role in the process. Ultimately, a better understanding of the differentiation mechanism will provide important advances in stem cell biology and medicine.

Rce1 Membrane Topology

Edward Lilla
Dr. Walter Schmidt, Department of Biochemistry & Molecular Biology, University of Georgia

Uncontrolled proliferation and migration of transformed cells in the human body is one of the main characteristics of cancer. The Ras signaling pathway, which is essential for growth in normal human cells, is hyperactive in cancer. The oncoprotein Ras has been identified as a possible therapeutic target for treating cancer. Rce1p is a protease responsible for post-translation modification of Ras. By inactivating Rce1p, Ras will not be able to initiate cell propagation in cancerous cells. In order to manipulate the activity of Rce1p, a better understanding of the mode of cleavage and topology of the protease must be gained. Western blotting and PEG-mal (methoxypolyetheylene glycol 5000-maleimide) modification of cysteines found in Rce1p will help determine the topology of Rce1p. Several yeast mating tests have been performed on yeast strains carrying various mutants of Rce1p. These mutants contain point mutations were in cysteines were modified to alanines or serines. The mating tests have verified that the yeast strains successfully express the desired mutant strains of Rce1p. The next step of our project is to perform PEG-mal reactions on the mutant

strains of yeast. Once the PEG-mal reactions are complete, Western blots can be performed on the samples. The results from the Westerns will help us determine if cysteine modifications of Rce1p occurred or not. The combined results from these several mutants will help determine if our current topology map is correct or needs modifications.

Developmental Changes in Human Infants' Strategies for Recognizing Human and Animal Faces

Hannah Machemehl
Dr. Janet Frick, Department of Psychology, University of Georgia

Infant face recognition is a popular topic of study within developmental psychology due to its dynamic development in the first year of life. In the present study we examined human infants' and adults' strategies for recognizing faces, as well as differences in the discrimination of human and animal faces. Participants included 4- to 6-month-old infants (n = 61), 9- to 11-month infants (n = 44), and adults (n = 67). Participants passively viewed faces of humans, capuchin monkeys, or sheep. These faces were manipulated in three ways: feature spacing (e.g., distance between the eyes), feature identity (e.g., eyes and mouth taken from one face and placed on another face), and facial contour (i.e., inner contents of the face on different heads). Participants were first familiarized with a face for 20 seconds. They were then shown 30 trials in which the same face was paired with a novel face for 4 seconds. We measured the proportion of time looking to the novel faces as a measure of discrimination. We found that with age, humans use additional strategies for recognizing faces. Specifically, 4- to 6-month-old infants only discriminated faces with different head contours. Older (9- to 11-month-old) infants also were sensitive to changes in facial features. Adults were additionally sensitive to feature spacing. We are currently examining differences across species. This work gives us insight into the development of face recognition, which is a fundamental ability for species-typical social relationships.

Membrane Topologies of E. coli HemH and HemG Biosynthetic Protein Studies Using Alkaline Phosphatase Fusions

Aisha Mahmood
Dr. Harry Dailey, Department of Biochemistry & Molecular Biology, University of Georgia

Heme biosynthesis in both eukaryotes and prokaryotes occurs via a highly regulated metabolic pathway of seven enzymatic steps, starting with the precursor compound 5-aminolevulinic acid. In the final two steps, a protoporphyrinogen IX oxidase (PPO) yields protoporphyrin IX, which reacts with ferrochelatase to yield protoheme. Research has focused on characterizing these enzymes at the molecular level. Presently this is achieved through cloning, over-expression and characterization of the enzymes of a multitude of organisms. PPO activity in eukaryotes occurs on the cytosolic side of the inner mitochondrial membrane and requires molecular oxygen as an electron acceptor. The membrane topology, however, is unclear in E. coli. There are various ways to determine sites where a membrane protein interacts with other proteins. A genetic method offers the advantage of independence from exposure or reactivity of amino acid side chains. Proteins that span the cytoplasmic membranes of E. coli have different domains exposed to the cytoplasm and periplasm. Fusion of a membrane protein to alkaline phosphatase can help characterize these domains and protein position. This experiment uses fusions of alkaline phosphate to both HemH and HemG to determine their membrane topologies. Ultimately determining the locations of these proteins will allow us to identify more effective drug targets in E. coli and lead to a deeper understanding of heme biosynthesis in eukaryotes.

Revisiting U.S. Procurement of Non-Emergency Food Aid

Ammarah Mahmud, Roosevelt @ UGA
Dr. Maria Navarro, Department of Agricultural Leadership, Education & Communication, University of Georgia

Non-emergency food aid assists 925 million chronically hungry people worldwide. The

United States is the largest contributor of foreign food aid, donating 55% of all food assistance in the past decade. Legislation requires the U.S. to purchase domestic goods and ship food on U.S.-flagged vessels. These requisites increase the costs of procurement and shipment, and reduce the quantity of food supplied per dollar spent. From 2001-2007, the costs of international transportation led to a 52% decrease in average tons delivered. The United Nations emphasizes the link between local production of agriculture and development, but procurement from target countries is not considered. The current policy's emphasis upon U.S.-domestic procurement and its misuse of expenses decrease the efficiency of non-emergency food aid. This paper discusses three potential policies to improve procurement efficiency. The first alternative suggests procuring food regionally and locally from target countries. The second delineates a public-private partnership between the U.S. federal government and a private organization. The final alternative advises the U.S. to buy the least expensive goods, and lacks domestic preferential treatment. Potential solutions are evaluated according to their effect upon target countries, political feasibility, and cost-effectiveness. This paper proposes the U.S. to partner with administrative organizations to research target areas and determine their local food production. This provides a direct relationship between the U.S. and target area, while maintaining a U.S. role when local goods are inadequate. This paper analyzes three competing alternatives and determines which is most efficient in combating hunger and developing long-term stability.

The Influence of Popular Adolescent Television Programs

Mona Malacane
Dr. Leonard Martin, Department of Psychology, University of Georgia

Sexual imagery in shows targeted toward adolescents may increase adolescent sexual behavior and body dissatisfaction. The present studies examine whether this imagery has increased in the past two decades and if it predicts attitudes toward women. In Study 1, we content analyzed a three episode sample of six adolescent show's Sexual Appearance and Sexual Behavior. We found that recent shows contained more Sexual Appearance and Sexual Behavior variables compared to older shows included in this content analysis. In Study 2, we will survey participant's viewership of these shows as well as their attitudes on ambivalent sexism, beliefs about women, their body shape and self esteem, and beliefs about female leaders. Based on participant's viewership, we anticipate finding that those who endorse ambivalent sexism, have more negative attitudes towards women, have lower body shape self esteem, and who view women as less effective leaders also watched more hours of recent television shows. Our research suggests that watching adolescent shows with more sexual variables influences attitudes towards women. Implications for more positive messages being used in the media are discussed.

***Bufo marinus* Pathogen and Parasite Analysis as a Model for Ecosystem Change**

Georgianna Mann, CURO Summer Fellow
Dr. Sonia Hernandez, Department of Wildlife Disease, University of Georgia

As human populations continue to increase, effects on the natural environment are inevitable. Quantifying these changes and their implications on species are imperative for ecological research. The Rio Tempisque Project in the Guanacaste region of Costa Rica attempts to address this through ecosystem experiments to measure the effects of human activity on the surrounding environment. This research strives to reveal if the cane toad, *Bufo marinus*, would be an effective sentinel species. Pathogens and parasites lead to detrimental effects on the health of amphibians. By studying the pathogen and parasite burden of cane toads in two different types of land management practices (high and low pesticide use), I aimed to determine: 1) if high pesticide agricultural areas can be long term surrogate habitats for cane toads, and, 2) if cane toads are an appropriate sentinel species for land use changes in the Rio Tempisque Basin. In June 2010, 18 *Bufo marinus* were collected in four field sites with various pesticide regimes in Costa Rica. Each were measured, sexed, necropsied and had fecal, intestinal and organ samples collected. The samples were examined

for lung and intestine endoparasites. The prediction of a positive correlation between the pesticide use and parasite prevalence was disproven. However, a positive correlation between location and parasite load in the toads was discovered, indicating that human land use may lead to an increase in parasite abundance. As a sentinel species, *Bufo marinus* would allow the Rio Tempisque project to scrutinize environmental changes as a result of human influence.

The Effects of Negative Political Campaign Advertising

David Mapp, CURO Apprentice
Dr. James Bason, Survey Research Center, University of Georgia

Between 60-65% of political campaign expenses are used for television advertising (Hale, Fox, and Farmer 330), making it the dominant modern campaign tool; however, in the recent gubernatorial election in Georgia, a large deal of political ads via television and other communication mediums were negative in nature meaning a portion of campaign expenses were used to simply discredit fellow competitors. Candidates for elective office today spend millions of dollars on negative political ads. Although some research has been conducted that examines negative political advertising, results of the effects they have on Georgia constituents have been mixed. My research will examine the opinions of Georgians regarding the prevalence of negative political advertising in the recent gubernatorial election between former Governor Roy Barnes and the eventual winner, Governor Nathan Deal. Using data from the Fall 2010 Georgia Poll conducted by the Survey Research Center at The University of Georgia, descriptive statistics on whether or not Georgians thought negative ads were present during the campaign will be computed, and the nature of how Georgians felt about the ads will be coded through responses to open ended questions. Finally, analyses will be conducted to see if demographic differences among Georgians regarding negative campaign ads existed.

Study of the Genetic Diversity of Isolated *Veratrum woodii* Populations in Georgia Using AFLPs

Alexandre Matte Santos
Dr. Wendy Zomlefer, Department of Plant Biology, University of Georgia

Veratrum woodii is a rare and protected plant species in Georgia. The species occurs in the southwestern and northern part of the state. These clusters of populations are separated by a distance of several hundred miles that would seem to prohibit outcrossing. Given the species' rarity in Georgia, managers at the Georgia Department of Natural Resources would like to know whether the southwestern and northern Georgia populations are genetically distinct. A management plan for the species should also include information on the overall genetic variation within and among of *Veratrum woodii* populations in Georgia. Over the course of the semester we identified primer combinations for Amplified Fragment Length Polymorphisms (AFLPs) for 13 populations *Veratrum woodii* and used these to characterize variation within and among populations that have been sampled from all known Georgia populations. These primer pairs are used to selectively amplify fragments of varying sizes of DNA; the differences in the sizes of the generated fragments then serve as a representation of the polymorphisms or variation between individuals or populations. Data was analyzed using GenAlEx, to characterize genetic structure using dominantly inherited markers such as AFLPs. We found that despite the physical distance, the *Veratrum woodii* populations are maintaining a majority of their variation among populations, and may be outcrossing freely which supports our hypothesis that outcrossing is still occurring. In terms of conservation, this means that it would be prudent to maintain conservation efforts for all populations in the state.

Assessment of 5-Aminolevulinate Acid Synthase Expression & Purification Methods

Elizabeth May, CURO Scholar
Dr. Harry Dailey, Department of Biochemistry & Molecular Biology, University of Georgia

Heme is synthesized in a series of eight steps which, unlike many other biochemical pathways, occurs in both the cytoplasm and the mitochondria. The first enzyme in this pathway is of particular interest, 5-aminolevulinate synthase (ALAS), a pyridoxal phosphate-containing protein. Although it is translated in the cytoplasm of the cell, its catalytic activity takes place in the mitochondrial matrix. Thus, in addition to posttranslational modifications to the precursor enzyme, preALAS, there also exists some translocation mechanism by which the precursor is transported into the mitochondria. Past studies have demonstrated that heme forms a negative feedback loop to its own biosynthesis at this point by inhibiting the uptake of preALAS (Yamauchi, 1979). Three conserved heme regulatory motifs (HRMs) have been observed on the preALAS enzyme (Timko, 1993). Two of these are located in region I of the enzyme, the leader sequence which targets the protein for transport, and the last is located in region II, closer to the N-terminus. While it has been demonstrated that these motifs are required for heme inhibition, the mechanism behind this is not currently understood. Thus, the main purpose of this project has been to determine whether or not heme physically binds to preALAS to regulate its own biosynthesis. Methods used to determine this relationship included protein expression, through various recombinant E.coli plasmids, as well as protein purification, through affinity column chromatography. Unfortunately, obstacles arose in the effort to obtain a purified form of the protein, so further binding assays were unable to be performed. The focus of the project subsequently shifted towards method alterations for improved protein yield and quality.

Zot* as a Potential Virulence Factor for *Neisseria meningitidis

Lauren McLeod
Dr. Anna Karls, Department of Microbiology, University of Georgia

Neisseria meningitidis (meningococci, MC) is a Gram-negative diplococci that exists as normal flora in the nasopharyngeal mucosa. However, despite this commensal relationship, MC is also one of the leading causes of bacterial meningitis. In a study by Bille et al. (2005), a comparative analysis of MC genomes from invasive strains (isolated from patients with meningitis) and carriage strains (isolated from healthy individuals) revealed a sequence corresponding to a filamentous bacteriophage that is significantly associated with only invasive strains. This prophage was named the Meningococcal Disease-Associated prophage (MDAΦ). Our study focuses on an MDAΦ gene, *zot*, which is proposed to encode a zonula occludens toxin that can disrupt tight junctions in the Blood Brain Barrier (BBB). This potential virulence factor may allow paracellular passage of MC across the BBB. To test the hypothesis that MC *Zot* can disrupt tight junctions, this study will examine the effect of MC Δ*zot* mutants on human brain microvascular endothelial cells (HBMEC) that model the BBB. Southern blotting analysis was used to assess the number of copies of *zot* in *N. meningitidis* Z2491 (serotype A) and 6 un-sequenced MC isolates. These Southern blotting results will be confirmed using PCR. Each copy of *zot* will be deleted and the resulting Δ*zot* mutant strain will be used to infect polarized monolayers of HBMEC. If MC *Zot* disrupts tight junctions, further studies will be conducted to define the role of *Zot* in MC pathogenesis. MC *Zot* may become a target for therapeutic or vaccine strategies.

Legitimacy and Status in Mixed-Gender Task Groups

Trenton Mize, CURO Scholar
Dr. Dawn Robinson, Department of Sociology, University of Georgia

The present research examines status and legitimacy in task groups using theories

stemming from the Expectation States Theory paradigm. In the present study, three participants took several pre-tests that measured their creativity, job and academic histories, etc. In one condition, the experimenter assigned a supervisor and told the participants this was based on their pre-test scores. In the other condition the group was told the supervisor had been randomly assigned. In actuality, the supervisor was assigned randomly in both conditions. The other two participants were assigned the role of assistant. The three participants then took part in a collectively oriented task group. In this experiment, both legitimacy of the supervisor (based on the method of assignment) and the gender of the supervisor and assistants were manipulated. This allowed for a 2x2x2 experimental design. It is predicted that female supervisors will have lower status and legitimacy as leaders when compared with male supervisors, and that supervisors who were "randomly" assigned will have lower status and legitimacy compared to the supervisors who were assigned based on "merit". The present analyses will examine status of the supervisors in the traditional method of self-report surveys filled out by all participants after the group activity, but also look at behavioral measures of status such as words spoken, criticism levied, and praise given. It is predicted that there will be an observable effect of undermining female supervisors authority and legitimacy when examining behavioral measures that will not be present or be less evident in the self-reports.

The Orpheus Myth Over Four Hundred Years

Caleb Moreno
Dr. Dorothea Link, Hugh Hodgson School of Music, University of Georgia

The Greek myth of Orpheus has been the focus of much discussion in the musical world, often seen as both a dramatic story and an allegorical lesson. Orpheus was the subject of one of the earliest operas in 1607 and since then has been adopted in many variations for opera. While much of the literature in the field has both reviewed performances of Orpheus operas and critiqued the operas as compositions, little study has been made in relation to their Greek origins. The aim of this paper is to investigate how the myth's involvement in opera has changed over time and how this is reflected in the music. First I will establish the Greek history and context of the myth. Then, I will sequentially detail four specific operas representative of the 16th through 20th century styles, comparing each to the Greek myth and to each other as appropriate. In the process I will highlight key differences in plot and character. These distinctions will indicate several approaches to the Orpheus myth: Monteverdi's retelling, Gluck's re-imagining, Offenbach's satirizing, and Birtwistle's comprehensive presentation of the myth. I will show how the music of each opera supports these approaches according to the musical language of each time period on a large scale and also according to the conscious aesthetic choices of each composer in specific scenes.

Epidemiology of Equine *Staphylococcus aureus* in Georgia and Kentucky from 1995-2003

Tatum Mortimer
Dr. Susan Sanchez, College of Veterinary Medicine, University of Georgia

Staphyloccus aureus can infect many animal species. In horses, *S. aureus* can cause respiratory, joint, and wound infections. Antibiotic resistance is a growing problem in medical and veterinary fields, as antibiotic resistant infections are difficult to treat. While methicillin resistant *Staphylococcus aureus* (MRSA) began as a nosocomial infection, in the past decade the infection has become community associated (CA-MRSA). Infection by MRSA occurs in companion animals, including horses, which could serve as a potential reservoir for human infection. Our purpose was to study the epidemiology of equine *S. aureus* obtained from clinical samples from 1995 to 2003 in Kentucky and Georgia. We hypothesized that equine MRSA isolates from Georgia and Kentucky would be clonal and related to the CA-MRSA strain USA500, similar to results of equine MRSA studies in other locations. Isolates were characterized by presence of *mecA*, SCC*mec* type, and toxin genes by PCR. Pulsed-field gel electrophoresis

(PFGE) was performed to assess the genetic relatedness of the isolates, as well as twelve human control isolates. 59% of isolates were positive for *mecA*. MRSA was found to be present in the horse population in 1996, earlier than the first reported case of equine MRSA and the CA-MRSA epidemic in humans. 92% of MRSA isolates were SC*Cmec* type IVd. Analysis of PFGE results revealed that 78% of MRSA isolates were closely related to each other and USA500. This clone appears to be highly successful in horse populations and was circulating among the horse population before recognition as a community acquired pathogen.

"Cuando uno toma el agua del Tambopata…": Migration and the urban environment in Madre de Diós, Peru

Bryn Murphy
Dr. J. Peter Brosius, Department of Anthropology, University of Georgia

The region of Madre de Diós, Peru, contains the best-preserved area of the Amazon rain forest and the highest levels of biodiversity on earth. Because of this notoriety, Madre de Diós is also home to a high concentration of non-governmental organizations (NGOs) focused on conservation and sustainable development. These NGOs are predominantly staffed by non-local professionals who were raised and educated in urban areas of Peru and later migrated to Madre de Diós to work. The purpose of this study was to evaluate whether the non-local and originally-urban characteristics of these NGOs' workforces affect conservation outcomes in rural versus urban areas of Madre de Diós. Interviews were conducted on a sample of fifteen employees of NGOs in Madre de Diós. Interviewees' responses were analyzed with reference to the social constructivist school of thought in environmental anthropology, which argues that social constructs cause people to value rural landscapes over urban landscapes, resulting in greater investment of conservation resources into rural landscapes at the expense of urban landscapes. In contrast with the predictions of the social constructivist literature, interviewees' responses demonstrated approximately equal valuation of rural and urban landscapes. These results suggest the need for further research, including a larger sample of interviews, to determine whether Madre de Diós truly represents a counterexample to social constructivist predictions.

Epigenetic Effects of Bromate on p21 and Histone-2AX Expression in HEK293 Cells

Krelin Naidu, CURO Summer Fellow
Dr. Brian S. Cumming, Department of Pharmaceutical & Biomedical Sciences, University of Georgia

The epigenetic effects of bromate (BrO_3^-) exposure in human embryonic kidney 293 (HEK293) cells were investigated. BrO_3^- is a byproduct of ground water disinfection procedures (oozonation). It has been designated a possible human carcinogen by the International Agency for Research on Cancer. BrO_3^- treatment (10 – 200 ppm) causes damage to HEK293 cells based on cell death assays and increased levels in specific regulatory proteins (p53, p38, cdc2, etc.) in HEK 293 cells over 72 hours. Immunoblot analysis indicates that BrO_3^- induced epigenetic changes as assessed by increased expression of phosphorylated histone-2AX (H2AX), a histone correlated with DNA damage that facilitates DNA repair. BrO_3^- exposure also led to a G2/M cell cycle arrest that correlated to increased expression of tumor suppressor gene, p-p53, and other regulatory genes p-p38, p21, cyclin B1 and p-cdc2. Treatment of cells at low concentrations (1 – 100 ppm) for 48 hours showed similar trends in protein expression levels suggesting that bromate's toxicity may lead to epigenetic alterations. Preliminary studies demonstrate that bromate treatment of human embryonic kidney 293 cells increases the phosphorylation of H2AX. This modification in histone expression level suggests the hypothesis that bromate, at low levels, induces epigenetic changes in *in vitro* models of toxicity.

Analysis of rRNA Maturation in *Escherichia coli*

Rakia Nasir
Dr. Sidney Kushner, Department of Genetics, University of Georgia

The maturation of ribosomal RNA (rRNA) in the bacterium *Escherichia coli* generates the functional species necessary for ribosome assembly. The rRNA genes in *E. coli* are organized into seven distinct operons that are comprised of 16S, 23S, and 5S precursors transcribed as a 30S precursor. Previously, it has been demonstrated that the 30S precursors are cleaved into four discrete pre-rRNAs with the help of endoribonuclease III (RNase III). Studies have shown that RNase III cleave sites on the double-stranded RNA in order for the maturation process to begin. However, our lab has demonstrated that additional enzymes participate in the separation of 16S and 23S rRNA species from the larger precursor. Our goal is to determine the ribonuclease(s) responsible for rRNA processing in the absence of RNase III. We hypothesize that a backup pathway involving multiple enzymes dependent on an RNA helicase unwinding the double-stranded RNA allow cleavages by other ribonucleases that cleave single-stranded RNA. To test this hypothesis, we are constructing specific *E. coli* strains, which are defective in potential and known ribonucleases that may affect the rRNA processing. RNA extractions will allow us to visualize the effect on rRNA in the absence of enzymes possibly involved in the rRNA maturation process A better understanding of rRNA maturation may facilitate the development of new antimcirobials that specifically target this pathway in bacteria.

The Effects of Manganese on Human Neural Stem Cell Cultures

Muktha Natrajan, CURO Scholar
Dr. Steven Stice, Department of Animal & Dairy Science, University of Georgia

Human Neural Stem cells (hNSCs) have the potential to replace brain cells in patients with neurodegenerative disorders. Neural cell adhesion and development depend on integrins, so using integrin activation, hNSCs can adhere to a substrate or implant in the brain to replace degenerated cells. Through activation of integrins, it is hypothesized that manganese (Mn2+) will direct cells to a glial fate more rapidly than random differentiation. This study's objective is to obtain an increased rate of gliogenesis due to integrin activation, which will result in a purified glial cell population. To increase the rate of gliogenesis, 0.03 mM MnCl2 differentiation media was added. Glial cell gene expression was determined by Real Time Polymerase Chain Reaction. Results indicated that five of the seven genes were positive with MnCl2. Immunocytochemistry was performed using standard immunofluoresence protocols. Antibodies against glial proteins were used, but only one was positive. Higher concentrations of manganese have been shown to cause symptoms similar to Parkinson's disease, but a challenge now is to identify the neurodevelopmental consequences of manganese exposure. We will also determine the point where manganese causes a lethal dose response. Neural Progenitor cells provide an excellent developmental avenue for understanding the effects of common materials/toxins that are present in development. I performed dose response testing using an Alamar Blue proliferation assay, which indicated a definitive dose-response to manganese. Ultimately, we will know how manganese can potentially increase neural cell adhesion and growth at lower levels and how it is toxic at higher concentrations.

Emotion Regulation in Children: Implications for Affect and Childhood Psychopathology

Cody Nichol, CURO Scholar
Dr. Cynthia Suveg, Department of Psychology, University of Georgia

Within the scope of emotion research, much attention has been paid to the role of negative emotions in youth psychological functioning, but only a scant amount to the role of positive emotions. Yet, theory and preliminary empirical research with adults suggest that positive emotions can facilitate cognitive and psychological functioning. With implications for treatment outcome, i.e., more effective clinical interventions, research which examines the role

that emotion plays in one's psychosocial functioning is crucial. The purpose of this study was to examine the specific role of positive emotions in relation to emotion regulation (ER) and the presence of psychopathology in children ages 7-12. The following hypotheses were generated. First, it was expected that situational appropriate displays of positive affect during the negative emotion tasks would positively correlate with ER. Second, it was hypothesized that displays of negative effect in the positive emotion task would negatively correlate with ER. Third, it was anticipated that ER would function as a mediator between affect and psychopathology. Overall, ER was expected to be negatively correlated with symptoms of psychopathology. To conduct this research, children and their parents independently completed measures of the child's ER and symptoms of psychopathology. Children and their parents also participated in a behavioral observation task that required the family to discuss a time when the child felt happy, angry, anxious and sad. Behavioral observations were coded using Observer XT, and frequencies of positive and negative affect were obtained. Data were analyzed with correlational and mediational analyses.

Dust and Breath - Works of Art and Technology

Brittany Norman
Prof. Martijn Van Wagtendonk, Lamar Dodd School of Art, University of Georgia

In *Genesis*, the creation of man is twofold: "And the LORD God formed man of the dust of the ground, and breathed into his nostrils the breath of life." My studies in art and technology both grow out of the same desire to create--to take the matter around me and give it form and give it life. Whereas my studies in art have given me the tools to bring shape to my ideas and give them form, my studies in technology have given me the tools to breathe life into these forms--to give them the ability to move, sense, and respond to their environment. This body of artwork is born out of a culmination of four years of interdisciplinary studies in computer science, engineering, digital media art and sculpture. Creation methods have involved a combination of studio art practices, computer programming, electronics design and mechanical design.

LysR-type Transcriptional Regulators

Melesse Nune
Dr. Cory Momany, Department of Pharmaceutical & Biomedical Sciences, University of Georgia

There are over forty LysR-type transcriptional regulators, LTTRs, in *Acinetobacter* sp. strain ADP1. According to the DEG (Database of Essential Genes), five of the many LTTRs in ADP1 have been predicted to be essential under specific growth conditions. The five essential LTTRs are ACIAD0461, ACIAD0746, ACIAD2511, ACIAD1539, and ACIAD2384. Only ACIAD2384 has homology to an LTTR with known function, MetR, which controls methionine biosynthesis in bacteria. *Acinetobacter baumannii* is a pathogen that is resistant to most antibiotics. As a result of its resistance to drug treatment, the bacterium kills tens of thousands of hospital patients each year, and specialists say that this pathogen is an emerging threat. The essential LTTRs in ADP1 are present in *A. baumannii* and, thus, may represent novel drug targets in the pathogen *A. Baumannii*. The investigation of the role of these LTTRs has been initiated by evaluation of the DNA sequences encoding the LTTRs, followed by the introduction of the essential LTTR genes into a plasmid that adds a polyhistidine C-terminal purification tag for simple protein purification from *E.coli* BL21(DE3) "Codon Plus" competent cells. All four LTTRs have been amplified by PCR and inserted into the expression vector. Successful protein purification of ACIAD0461 using metal-chelate chromatography has transitioned to crystallization studies in anticipation of providing valuable structural data. The structural and functional studies done on these LTTRs, improve our understanding of microbial metabolism and transcriptional regulation, and also help us identify novel drug targets that may lead to an important drug discovery.

The Effect of N-Back Stimuli Type on Performance

Laura O'Neill, CURO Apprentice
Dr. Rebecca S. Marshall, Department of Communication Sciences & Disorders, University of Georgia

Aphasia is a multimodal language deficit that results from damage to the language areas of the brain. Recent research in aphasia has considered the role of working memory. Working memory can be assessed using the N-back, a computerized task composed of alternating images that recur at specified intervals. In recent aphasia research, two different versions of the N-back have been used, one using fruit and the other using faces. The current study seeks to determine if stimulus type (fruit or faces) influences task performance of individuals with aphasia. For instance, if individuals engage in sub-vocal rehearsal of presented items, the task becomes linguistic. This is far more likely to occur with the fruit stimuli, for it is unlikely that individuals will be able to name face stimuli, making the task nonlinguistic. Results from the current study will aid in determining how to most accurately measure working memory in aphasia. In the current study, the fruit-back and faces-back were compared in healthy and aging populations. Individuals with aphasia (N=3, Mean age=62.3) and neurologically intact controls (N=18, Mean age=82.27) were recruited. Both the fruit and faces tasks consisted of three levels correlated to increasing working memory load. Data were analyzed based upon the number of correct responses, errors of omission, and errors of commission. A difference in performance between healthy individuals and IWA is expected in the linguistic task, but not in the nonlinguistic. A better understanding of working memory's role in aphasia can lead to improved assessment and ,therefore, rehabilitation of aphasia.

Investigating Early Warning Signals and Critical Slowing Down in Changing Environments

Tierney O'Sullivan
Dr. John Drake, Odum School of Ecology, University of Georgia

Extinction has long been a fascination of scientists but is incredibly difficult to study comprehensively. It is becoming an increasingly important topic due to habitat fragmentation and climate change throughout the world. The difficulty of studying extinction is that scientists often predict it, but are unable to reverse it because of late detection. The problem is that extinctions result from bifurcations, when a small change in a parameter creates a significant change in the system's behavior. Once a bifurcation occurs, the result is often irreversible. We used Daphnia magna as a test subject to investigate the presence of early warning signals in the form of increases in statistical patterns such as variance, autocorrelation, and standard deviation from the mean. These changes can predict extinction before the bifurcation occurs. The Daphnia populations were assigned to 96 chambers, and each chamber was assigned one of four treatments where all environmental conditions were kept constant except temperature. The temperature treatments divided the chambers into four categories: constant, increasing, periodic, and decreasing. Population sizes in the chambers were recorded daily, and the data were analyzed to determine the presence of the early warning signals of the critical slowing down phenomenon using statistical tests in R. The analysis uses a range of window sizes to detect increased levels of the indicators, which can predict bifurcations that lead to extinction. Additional analysis must be done to determine if the presence of the signals in the data is conclusive.

Expression of the DBL3x domain of VAR2CSA in *E. coli*

Oluremi Ojo, CURO Apprentice
Dr. David Peterson, Department of Infectious Diseases, University of Georgia

Plasmodium falciparum, the parasite that causes the most virulent type of malaria, results in nearly one million deaths annually. Our research focuses on pregnancy-associated malaria (PAM), which accounts for 10,000 annual maternal deaths and 3% to 8% of infant mortality in Sub-Saharan Africa. PAM results from infected erythrocytes binding to chondroitin sulfate A (CSA), a receptor on the placenta, preventing nutrient exchange between the mother and fetus. Infected erythrocytes express the protein VAR2CSA, which mediates binding to the placenta. VAR2CSA is a large protein and consists of six different domains called DBL1-DBL6. We primarily focus on studying the DBL3x domain, which has been shown to mediate parasite binding within the placenta. Our goal is to characterize the binding of DBL3x in an effort to further understand the mechanisms of the parasite's adhesion to the placental CSA. In our study, we have isolated variants of the DBL3x domain from blood samples obtained from pregnant women in Kenya. Our goal is to understand how binding of the DBL3x domain differs between these samples. To achieve this goal, we use PCR based methods to amplify the DBL3x region from our samples and ligate them into a plasmid that allows expression of this protein in *E. coli*. The purified protein will be used in binding studies to placental CSA to analyze its binding properties. Understanding the binding properties is important as a disruption at this step could prevent infected erythrocytes from binding to the placenta and, ultimately, decrease the virulence of Plasmodium falciparum in PAM.

Evaluation on Blood Flow Velocity and Arterial Diameter Produced by Compression Therapy

Rebecca Parker, CURO Scholar, CURO Summer Fellow
Dr. Kevin McCully, Department of Kinesiology, University of Georgia

Exercise is an effective treatment for cardiovascular disease. A proposed mechanism for the benefits of exercise is the increase in blood flow and subsequent increase in arterial vasodilating capacity. Some have difficulty performing adequate exercise due to disabilities and, therefore, suffer from cardiovascular disease. This study was designed to determine the optimal body position during leg compression therapy to augment blood flow resulting in arterial vasodilation. Twelve able-bodied control subjects completed a round of compression therapy—termed muscle pump (90mmHg @ 5s) in the supine position, and twelve subjects were in a seated position. Ultrasound velocity measurements of the femoral artery were taken during: 3 minutes baseline, 8 minutes compression and 2 minutes recovery. Femoral artery diameter was recorded at baseline and immediately after compression ended. Average blood velocity was 129.7 Â± 68.9% (meanÂ±SD) of baseline while in the supine position and 138.7 Â±49.4% for the seated compression tests (both not significant, $P > 0.05$). Femoral artery diameter after the supine test was 103.5 Â±0.47% of baseline, while the diameter after the seated tests was 99.4 Â±5.3% of baseline (both not significant, $P > 0.05$). Preliminary evidence suggested that neither the supine nor the sitting positions resulted in a significant increase in average blood flow velocity. However, the trend for an increase in diameter while in supine position suggests that the velocity oscillations could have physiologically important effects on diameter. If confirmed, "muscle pump compression" could be a viable method for improving arterial health in people who have difficulty exercising.

Pronunciation of Word-Final [ə] by Older Male Speakers from the South of France

Matthew D. Passarello
Dr. Diana L. Ranson, Department of Romance Languages, University of Georgia

A notable feature of Southern French dialects is the variable pronunciation of word-final mute *e*, which is almost never pronounced in the North, so that a Southern speaker might say [kɹməsa] rather than [kɹmsa] for *comme ça* 'like that'. Even though this vowel is subject to variability in the South, little attention has been paid to the factors affecting its pronunciation. The goal of the present study therefore is to analyze the possible linguistic factors favoring the pronunciation of mute *e* by Southern speakers. The corpus consists of 236 tokens of mute *e* in recorded conversations with seven men over 40 years of age from the South of France. The linguistic factors tested are the mode of articulation, point of articulation, and voicing of the consonants preceding and following the potential mute *e*. The results indicate that the following consonant affects the pronunciation of mute *e* while the preceding consonant does not. Whereas the total rate of pronunciation of word-final mute *e* is around 40% for preceding consonants, regardless of their mode of articulation (whether stop, fricative or liquid) or voicing (whether voiced or voiceless), these rates range from 25% to 57% for following consonants. The highest rate of pronunciation occurs before stops, especially when the preceding consonant has a different mode of articulation. Rates of pronunciation are also higher when preceding and following sounds differ in voicing. It appears then that mute *e* is more often pronounced between dissimilar sounds perhaps in order to facilitate the articulatory transition.

The Role of Histidines in pH Dependence of Human Equilibrative Nucleoside Transporter 3

Bhavi Patel, CURO Scholar
Dr. Rajgopal Govindarajan, Department of Pharmaceutical & Biomedical Science, University of Georgia

Human equilibrative nucleoside transporter 3 (hENT3) is one of four members of the equilibrative nucleoside transporter (ENT) family, a conserved family of solute carrier (SLC) proteins that allow for facilitated diffusion of nucleosides and anti-cancer and anti-viral nucleoside analogs. hENT3 differs from other members, which are predominantly cell surface transporters, in that it functions exclusively intracellularly, localizes to organelles such as the lysosome and the mitochondria and shows maximum transport activity at an acidic pH range of 5.5-6.5. In this study, we will determine the amino acid residues that are responsible for hENT3's pH dependence. Histidine has a pKa of approximately 6.0, and has been shown earlier to regulate pH dependent ligand-binding of many membrane proteins and receptors. Histidine has a positive charge at pH 5.5, where hENT3 shows maximum transport activity. At pH 6.5 and greater, however, histidine does not and hENT3 transport is inhibited. Therefore, we hypothesize that changes in the ionization of one or more histidine residue(s) (e.g. positions 132, 268, 294, 403 and 473) in the predicted translocation pore of hENT3 protein are likely regulating its activity. To study this, we will mutate, either singly or in combination, histidines in hENT3 to neutral, positive and negative amino acids through site-directed mutagenesis. Subsequently, we will perform radio labeled transport studies on mutant RNA injected Xenopus oocytes to study alterations in known endogenous substrates (e.g. adenosine). These studies are expected to lay groundwork in understanding the mechanisms of hENT3 transport of nucleoside drugs used in clinics.

Characterization of Striated Fiber Assemblins in *T. gondii*

Jay Patel, CURO Summer Fellow
Dr. Boris Striepen, Department of Cellular Biology, University of Georgia

In *Toxoplasma gondii*, an obligate intracellular parasite, there is a unique set of proteins known as striated fiber assemblins (SFAs). The tachyzoite stage of this Apicomplexan parasite contains three distinct SFA proteins: SFA2, SFA3 and SFA4. Although SFAs are yet to be characterized in Apicomplexans, one such SFA protein has been described fairly well in the algal ancestor of Apicomplexans, *Chlamydamonas reinhardtii*. Immunofluorescence assays (IFAs) using an anti-SFA antibody in *Chlamydamonas* have shown that SFA is dynamic over the cell cycle and may play a structural role during division. Fluorescent microscopy of the SFAs in *T. gondii* under the strong and constant t7s4 promoter has shown possible localizations and structures for SFA2 and SFA3. These results might not be reliable due to overwhelming background fluorescence within the cell. Also, microarray data shows strict regulation of SFA2 and SFA3 during the cell cycle. The results of these experiments suggest that SFAs are sensitive to the time they are promoted and the strength with which they are expressed. With antibodies against *T. gondii's* SFAs, more accurate localizations and structures of the SFAs during different stages of the cell cycle were identified. The results of the experiments will provide a deeper understanding of the biology of *T. gondii* and the disease that it causes. Furthermore, insight into the function of SFAs could have implications for other Apicomplexan diseases such as malaria and cryptosporidiosis.

Battling With Bytes: A Cybersecurity Doctrine for the United States

Tony Pelli, Katherine Arnold, Yuliya Bila, Rohan Mukhopadhyay, Shyam Shanker, Patrick Smith & Seth Taylor, Roosevelt @ UGA
Dr. Dan Everett, Department of Computer Science, University of Georgia

Cyber security is becoming an important security issue, as the recent attack on Iranian nuclear centrifuges by the computer virus called "Stuxnet" demonstrated. In terms of U.S. vulnerabilities, many experts fear that cyber attacks could cripple critical infrastructure in the electricity and banking industries. Despite the increasing importance of cyber security to the United States' national interest, there has been little comprehensive research on the danger posed by cyber attacks. Current research on the issue is focused too narrowly on the threat posed by cyber-terrorism or "lone wolf" hackers. This paper presents a database of known major cyber attacks by both state and non-state actors. It further identifies the type of cyber attack, which nation or group it originated from, and the intended target. In addition, this paper presents an evaluation of the cyber security capabilities of several key countries including Russia, China and EU member states. Upon examination of this data, we conclude that the threat of cyber attacks is indeed serious, but should not be overstated. Following this conclusion, the paper identifies several areas in which the United States can improve its cyber security and outlines a cyber security doctrine to guide future policies. In particular, public-private coordination and budgetary changes are suggested. Additionally, special attention is paid to the possibility of cooperation between states over cyber security issues.

Cognitive X's and O's: First Steps in the Resolution to the Offensive-Defensive Realist Debate

Chad Peltier
Dr. Jeff Berejikian, Department of International Affairs, University of Georgia

The offensive and defensive realist debate is primarily over how states prioritize security preferences. Do states seek to defend the status quo, as loss aversion would predict, or do they constantly feel the pressure to expand in a gain-seeking manner? I contend that states' grand strategies contain both types of behavior. This study bridges the gap between the offensive and defensive realist camps by using loss aversion, which was recently supported by studies in cognitive neuroscience, as the decision making structure instead of rational choice theory. I conducted an ordered logistic regression analysis

of the COW militarized interstate dispute dataset in order to determine how states prioritize their security preferences as either gain-seeking (offensive) or loss aversive (defensive).

A Flow Cytometry-Based Method of Glycosylation Profiling

Emily Peng
Dr. Robert Woods, Department of Biochemistry & Molecular Biology, University of Georgia

Glycoproteins are polypeptides that have oligosaccharide chains, or glycans, covalently attached to their surfaces. These polymers play essential regulating, functional, and structural roles in biological systems by providing a means for cell-to-cell interactions. Determining the types and amounts of glycans present on the surface of a glycoprotein provides key information about the function and development of the protein. In order to be accepted as therapeutic agents, glycoproteins must have their glycosylation states thoroughly characterized. Currently, procedures for glycosylation profiling involve combinations of mass spectrometry and high-performance liquid chromatography. These methods are complex, time consuming, and do not always give a complete characterization of a protein's glycans. We are developing a more efficient and complementary flow cytometry-based method of glycan analysis. In this method, proteins that bind specifically to certain glycan linkages (lectins) were covalently attached to microspheres, or beads, with discrete levels of red fluorescence. The lectin-bead conjugates were incubated with a solution of oligosaccharide labeled with green fluorescence. The amount of glycan bound to each lectin bead was measured in a flow cytometer. The higher green fluorescence intensity of a lectin bead relative to the other beads confirmed that the glycan of known linkage bound specifically to its lectin, and shows this method can correctly indicate the types of glycans present in solution. The results also show that this method has potential for identifying glycans on the surface of glycoproteins.

Oil Palm Proliferation in Latin America

Rachel Perez, CURO Apprentice, CURO Summer Fellow
Dr. J. Peter Brosius, Department of Anthropology, University of Georgia

This project examines the environmental and social effects of the oil palm/palm oil industry throughout Latin America by reviewing literature from a variety of sources in order to create a concise report. Palm oil, extracted from the African oil palm, is a highly profitable product whose diverse uses have most recently expanded to include bio-fuel. Cultivation of the palm occurs primarily in Southeast Asia, but is rapidly expanding to Latin America, largely to the detriment of the region. Oil palm cultivation occurs chiefly on large-scale monoculture plantations, a practice that causes ecological damages including deforestation, decreased biodiversity, and air, soil and water pollution. Cultivation practices also have negative social effects: local populations (often composed of marginalized groups such as racial/ethnic minorities) suffer land rights violations, displacement, unhealthy living and working conditions, decreased political representation and threats of violence among other afflictions. The oil palm mega-plantations create land scarcity, causing a significant decrease in food crop cultivation and a subsequent increase in food prices throughout the region. Large-scale growers use political and economic power to continue unsustainable practices in the name of short-term economic efficiency, while opposition groups, a demographic including conservationists, human rights organizations, universities and local populations, struggle with coordinating a united front in order to confront industry abuses. This project aims to bring more attention to a lesser-known environmental issue and present the findings and possible resolutions to interested parties in the hopes of addressing this issue before it progresses in to a more advanced state.

The Use of PCR Assays to Determine the Extent of Zones of Hybridization of *Culex pipiens quinquefasciatus* and *Culex pipiens pipiens* in Georgia

Katherine Perofsky, CURO Scholar
Dr. Daniel Mead, Department of Population Health, University of Georgia

In Georgia, *Culex pipiens quinquefasciatus* has been identified as the primary vector of West Nile virus (WNV). Statewide WNV surveillance data collected between 2001 and 2008 indicates that during the peak transmission period (July through late September) WNV infection rates in *Cx. p. quinquefasciatus* are high. However, in Georgia the low number of reported human cases of West Nile virus does not correlate with the *Culex* mosquito high infection rate. A study conducted on Georgia mosquitoes in 2003 reported the occurrence of *Cx. p. quinquefasciatus* and *Cx. p. pipiens* hybrids in an area within the state which is outside of the previously recognized hybridization zone (the northern region of Georgia). Hybrids of these species may have an alteration in host feeding preferences which could account for the low number of human WNV cases in the state. We hypothesize that the *Culex* hybridization zone is more widespread in the state as opposed to limited to Northern regions. To redefine the hybridization zone in Georgia, we used a previously described PCR protocol to analyze specimens of *Culex pipiens quinquefasciatus* and *Culex pipiens pipiens* that were collected from various regions of Georgia and identified based on morphology. The results of this study show the extent of hybridization between *Cx. p. pipiens* and *Cx. p. quinquefasciatus* to be small, yet suggest the hybridization zone in Georgia encompasses a wider area than previously considered.

Expression of Heat Shock Proteins 27 & 72 in Canine Intracranial Meningiomas

Grant Perry
Dr. Simon Platt, College of Veterinary Medicine, University of Georgia

Meningioma is the most common type of brain tumor in dogs and the most likely to be treated. Heat shock proteins (HSPs) are up-regulated during times of environmental stress and are associated with tumor maintenance via stabilization of tumor proteins. HSPs 27 and 72 have previously been shown to be present in human tumors, which make these HSPs a reasonable target for tumor therapy. The goal of this study was to see if HSPs 27 and/or 72 are expressed in canine intracranial meningiomas and, thus, potentially a therapeutic target. The study also sought to determine any similarity between human and canine tumors. This was a retrospective study of forty-one tumor samples from dogs. Immunohistochemistry (IHC) was performed using anti-HSP 27 or 72 antibodies to detect the presence of each HSP. Control samples used were canine mammary carcinoma and squamous cell carcinoma, both of which express HSPs. Staining intensities and percentages of tumor area were determined for each protein by semi-quantitative methods. HSP 27 was expressed in greater than 1/3 of cases (36%). HSP 72 was expressed in greater than 1/2 of cases (52%). Additionally, both HSPs were expressed in 21% of cases. This shows that expression of HSPs 27 and 72 does occur in canine intracranial meningiomas and deserves further investigation. Their potential as a target for treatment is also being evaluated further in association with markers of cell proliferation and dedifferentiation.

Women with Naturally Bright Red Hair Report Higher Pain in Response to Thermal Stimuli and Reduced Pain in Response to a Mild Muscle Injury Compared to Dark-Haired Women

Akil Piggott, CURO Apprentice
Dr. Pat O'Connor, Department of Kinesiology, University of Georgia

Variations in the melanocortin-1 receptor gene that result in bright red hair also are associated with a greater sensitivity to cutaneous thermal pain among women. It is of practical significance to learn whether women with bright red hair also are more sensitive to other noxious stimuli that cause pain. This study aimed to compare the cutaneous thermal and muscle pain responses of women with naturally bright red hair to women with dark-hair in response to a mild muscle injury. Red (n=5)- and dark-haired

(n=5) women were tested on 3 successive days. Measures of inflammation, pain and function of the non-dominant arm were obtained before and after 18 eccentric actions of the elbow flexors which induced a mild muscle injury. Changes in inflammation, arm function, forearm flexor strength, and both muscle pain and cutaneous thermal pain were induced by 2-second heat exposures of 45, 47 and 49°C presented to the skin of the non-dominant forearm and posterior lower leg using a 30x30 mm thermode. Compared to dark-haired women, women with bright red hair reported: (1) higher pain intensity (arm = 19% & leg 23% higher) and pain affect (arm = 34% & leg 15% higher) ratings, and (2) a greater reduction in pain ratings in response to the muscle injury (effect size deltas of .15 to .61). Effects on inflammation and arm function were smaller. The primary novel finding is that red-haired women show a greater reduction in pain ratings in response to muscle injury compared to dark-haired women.

Witch-Doctoring Tolstoy: Applying Traditional Healing Philosophies to *The Death of Ivan Ilych*

Ryan Prior, CURO Summer Fellow
Dr. Katarzyna Jerzak, Department of Comparative Literature, University of Georgia

As the humanities provide us with a rich reservoir of wisdom on what it means to be human and to live a good life, viewing the body and illness from a perspective beyond the merely biochemical can yield not only better doctors but also a better society. Throughout history, different civilizations have had widely varying medical philosophies, stemming from their religion and philosophy as much as their art and literature. Studying notions of sickness and death in Western literature, we can find yearnings for a more humane medicine, one that realizes that healing must be as spiritual and emotional as it is physical. In Tolstoy's meditations on sickness and death in *The Death of Ivan Ilyich,* we find a character whose attempts to find healing through relationships are condemned by a medical doctor as "foolishness." Yet Ayurvedic practitioners in India, valuing community, inquire about a patient's social well-being in the initial consultation. Ivan Ilyich comes to realize that his moral failings, family relations, and bitterness are as much to blame for his illness as his actual physical make-up. His internal monologues seem as if taken from sociological and anthropological case studies of Ayurvedic practitioners, healers who might tell victims of anxiety not to take Xanax, but to gain perspective by spending time with the poor. In comparing Ayurvedic case studies with passages from Tolstoy's text, this study will construct an Ayurvedic "treatment" for Ivan Ilych, one that aligns with the character's own judgments of himself, a philosophical cure that succeeds where science could not.

The Effect of Parasite Infection on Monarch Butterfly Mating Behavior

Malavika Rajeev, CURO Summer Fellow
Dr. Sonia Altizer, Odum School of Ecology, University of Georgia

Monarch butterflies (*Danaus plexippus)* are commonly infected by a debilitating protozoan *Ophryocystis elektroschirra*, which can inhibit growth and decrease survival of individuals in wild populations. This study examined the effect of parasite infection on monarch mating contests and mating success. Monarchs have a unique mating behavior (called 'forced copulation') whereby males chase and force themselves onto passing females. Although female monarchs do not actively choose their mating partners, females can struggle to avoid mating with certain males, and males may abandon attempts with certain females. Because infected monarchs are often in poorer condition than healthy butterflies, and mating with an infected partner poses the risk of spore transmission to offspring, infected male and female monarchs might mate less often than healthy butterflies. Lab-reared healthy and experimentally infected adults, equally distributed across sex and infection status, were placed in large outdoor enclosures. Mating contests and successful matings were recorded over 10 days. Our results showed that both healthy males and females mated more frequently than infected butterflies; however, this effect did not reach statistical significance. While the average number of contests per day was slightly higher for healthy versus infected

males, infection status did not have a significant effect on mating attempts. Most successful matings were between healthy males and infected females. Collectively, these results suggest that monarchs do not discriminate between healthy and infected mates, which should benefit parasites by allowing continued transmission via mating contacts.

Development of a System for Targeted Mutagenesis in *Mycobacterium Tuberculosis*

Akanksha Rajeurs, CURO Scholar
Dr. Russell Karls, Department of Infectious Diseases, University of Georgia

One third of the world population is infected with *Mycobacterium tuberculosis*. Annually, 7 to 9 million infected individuals suffer from active tuberculosis disease (TB) resulting in ~ 2 million deaths. The current TB vaccine, *Mycobacterium bovis* BCG, is rarely used in the U.S. because of variable efficacy (0-80%) against pulmonary TB. Attenuating *M. tuberculosis* to produce a more effective, safe, live vaccine will require deletion of multiple virulence factor genes from the chromosome. Current selection systems to delete genes from this bacterium utilize homologous recombination to replace a target gene with an antibiotic resistance gene. As a vaccine strain encoding multiple antibiotic resistances may lead to transfer of antibiotic resistance genes to other bacteria, we are developing a modified system to first replace the chromosomal gene with a cassette of genes encoding a selectable marker, a fluorescence marker and a counter-selectable marker. The first enables selection for the mutant. The second aids microscopic analyses of the mutant. The third provides a means for subsequent deletion of the cassette from the chromosome resulting in an unmarked, drug-sensitive mutant. Efforts are in progress to use this system to target a natural antibiotic resistance gene in *M. tuberculosis* and *M. bovis* BCG. Deletion of this gene will result in bacteria that can be killed by the antibiotic.

Kinetic, Temperature Dependent and Structural Analyses of YqhD, an Escherichia coli NADPH Dependent Oxidoreductase Enzyme

Cortney Ralston
Dr. William Lanzilotta, Department of Biochemistry & Molecular Biology, University of Georgia

YqhD is an $NADP^+$ dependent oxidoreductase that is of extreme importance to the cell. In general, YqhD catalyzes the reduction of toxic aldehydes produced from aerobic respiration in an NADPH dependent reaction. Buildup of toxic aldehydes in humans has been linked to diseases such as cancer, diabetes, emphysema and arthritis (Perez et al 2008). Our laboratory has determined the specific activity as well as the K_M and V_{max} of YqhD for propionaldehyde by performing assays that monitor the NADPH dependent reduction of propionaldehyde using UV-Visible spectroscopy. Our laboratory also elucidated a crystal structure for YqhD in order to address substrate specificity. Our hypothesis was that YqhD must also have an "open" confirmation, in contrast to what was originally reported. Our structure confirms this hypothesis and provides an explanation for the observation that YqhD can reduce several aldehyde substrates. A second hypothesis was focused on the application of YqhD, in combination with *Pyrococcus furiosus* hydrogenase I (PFH-I), in hydrogen-driven production of 1,3-propanediol, a compound used to manufacture a polymer that can be spun into a strong but flexible fiber. PFH-I is unique in that it can be used in the production of NADPH through the oxidation of hydrogen gas. Given that *P. furious* is a hyperthermophilic anaerobe, and recent evidence for YqhD genes in thermophiles with high homology to YqhD from *E. coli,* we proposed that YqhD may demonstrate some temperature stability and be applicable in hydrogen-driven production of 1,3-PD. An investigation of YqhD activity at elevated temperatures is presented herein.

Victory over the Sun: The Russian Futurist Transcendence over Materiality

Joanna Reising
Dr. Nell Andrew, Lamar Dodd School of Art, University of Georgia

Victory over the Sun, a Russian Futurist opera performed in St. Petersburg in 1913, was the combined effort of three prominent Russian Futurists: Kazimir Malevich, who designed the sets and costumes; Alexei Kruchenykh, who wrote the dialogue; and Mikhail Matiushin, who wrote the music. The Three Futurists were out to reform Russian theater, to transform it in the ways of the new art. This opera, with the combined efforts and innovations of three important Russian futurists, was a pivotal moment in the history of Russian Futurism. Although it was something uniquely Russian, its creators relied on inspiration from the west, namely Cubism and Italian Futurism. *Victory over the Sun* is the culmination of Russian Futurist theories that collaborate in a performance not meant to lead the audience to a clearer image of forms in space as with their French and Italian counterparts, but into a particularly Russian utopia of nonsense, through transcendence over the Sun, the personification of the material and rational. This is an important point to make when considering the avant-garde as a whole as it was developing across Europe. The styles and ideas borrowed from French Cubism and Italian Futurism fully entrench Russian Futurism in the Western tradition. But the opera in particular proved that Russian Futurism was not limited to painting or sculpture or poetry; it was a cacophonous combination of all media that lent itself to a pre-revolutionary Russian moment.

Design of a Computed Tomography Scanner with Components from an Existing DEXA Machine

Katherine Riccione, CURO Scholar, Ryan Boelter, Tina Carson & Chase Mooney
Dr. Mark Haidekker, Department of Biological & Agricultural Engineering, University of Georgia

A computed tomography (CT) scanner is to be designed with a number of components obtained from an existing dual-energy x-ray absorptiometry system (DEXA). These components include a dual-energy x-ray generator, a detector consisting of a scintillator crystal connected to a photomultiplier tube, and the necessary electronics for the x-ray source. The design was given a number of requirements, including a point spread function of at least 5 mm, volumetric scan ability, pencil beam geometry with an x-ray intensity of no greater than 140 keV, and a shielding apparatus that no more than doubles the background radiation at a distance of 1 m. With the x-ray source, detector and electronics provided by the existing DEXA system, the remaining components to be designed include a rotational sample stage capable of translational movement along the x-, y-, and z-axes; suitable sample holders that allow for observation of the sample during operation; a proper shielding apparatus; and any necessary software for calibration and image collection. Once complete, this CT scanner will be available for researchers in the UGA engineering department and will be capable of scanning various samples including, but not limited to, small animals, bones, plant materials and geologic matter. The benefits of this CT device over its original DEXA forerunner include faster image acquisition time, better image resolution, and the ability for selectable projections.

Effects of *Ligustrum sinense* Presence and Removal on Nitrogen Mineralization Rates

Rebecca Risser
Dr. Paul Hendrix, Odum School of Ecology, University of Georgia

Chinese Privet (*Ligustrum sinense*) is a common invasive in the southeastern United States, particularly in low lying riparian areas. Other invasive shrub systems have been found to have effects on soil characteristics and processes. As a result, nutrient cycling is often affected. This study explores the effects of privet removal on nitrogen mineralization rates at sites in the Oconee River basin. Four sites were selected and treated four years ago, each containing three plots: 1) The control in which privet was present; 2) privet felled by chainsaw; and 3) privet chipped by a mulching machine. In

addition, three reference, or desired future condition sites which are naturally privet free, were sampled. Soil samples were collected from these sites and were incubated for 28 days to determine net ammonia and nitrate mineralization rates. Preliminary results indicate that mulched plots have higher mineralized nitrogen than control plots and plots where privet is removed by felling. High biomass input into the mulched system combined with smaller particle size may have lead to this result, along with flooding in 2008 which washed away debris from the felled sites particularly.

Using Fluorescence to Identify Insect Damage to Cotton Bolls

Erin Roberts, CURO-Engineering Participant
Dr. Mark Haidekker, Department of Biological & Agricultural Engineering, University of Georgia

Every year, cotton crops across the Southeast United States are damaged by stink bugs feeding on the cotton bolls, rendering them unusable. When a stink bug feeds on a cotton boll, it can create three types of damage: lint damage, "warts" on the inner carpal wall and exterior puncture marks. As cotton is a vital industry, a fast and easy method of detection of infestations is needed. We discovered that this damage is associated with blue-green fluorescence under ultraviolet excitation. The purpose of this research is to determine whether fluorescence can be used in the field to diagnose cotton bolls as either damaged or undamaged. We examined cotton bolls that were grown in a greenhouse, some of which were exposed to stink bugs and others which were not. Images of all sides of the cotton bolls were then taken under ultraviolet light and blue LED light using a highly sensitive camera. Then the cotton bolls were manually opened and inspected for any signs of damage. We have found that there is a specific pattern of fluorescence on the outer carpal wall that is indicative of interior lint damage. This information can be examined with image analysis methods to predict if a cotton boll has internal damage without opening the boll.

Improving the Claims-Making Process in Context to the 2010 Deepwater Horizon Oil Spill

John Rodriguez, Roosevelt @ UGA
Dr. Leara Rhodes, Grady College of Journalism & Mass Communications, University of Georgia

The 2010 *Deepwater Horizon* Oil Spill decimated the tourist-dependent economies of the five affected states (Texas, Mississippi, Louisiana, Alabama, and Florida), and shattered the livelihoods of those who lived there. At the behest of President Obama, the responsible party created a $20 billion escrow fund in order to compensate affected individuals and businesses. This project analyzes the shortcomings of the Gulf Coast Claims Facility (GCCF) in an effort to create a more effective alternative claims process. We hypothesize that anecdotal evidence will support the data that summarizes the difficulty (both on a logistical and administrative level) of the claims procedure. The anecdotal evidence and qualitative data collection was gathered through interviewing individuals who were affected by the Spill and who had a first-hand experience of the claims process. The GCCF failed in the following ways: it was unprepared to handle the vast amount of claims; it did not have an established protocol in handling claims; and it also had close ties BP. The research concludes that in the case of future incidents, a governmental agency needs to be established to handle the response process, equipped with an agreed-upon procedure and appointed administrator to impartially judge individual claims. The only involvement the responsible party will have in the agency will be in funding the claims. The agency's claims analyst staff should be increased so as to assist claimants both quickly and effectively. With such an agency in place, future claims processes will be handled more transparently and promptly.

Morphological Changes Accompanying Killing of *Trypanosoma brucei brucei* by Human Serum

Carla Rutherford, CURO Summer Fellow
Dr. Stephen Hajduk, Department of Biochemistry & Molecular Biology, University of Georgia

Trypanosoma brucei brucei is a eukaryotic parasite that infects mammals, but is unable to infect humans due to the cytotoxic activity of human serum, mainly as a consequence of a minor subclass of serum high-density lipoprotein called Trypanosome Lytic Factor (TLF-1). Conflicting observations have complicated our understanding of the mechanism of *T. b. brucei* killing by human serum. To elucidate the killing mechanism, we analyzed morphological changes associated with human serum treatment, using both fixed cell imaging and time-lapse microscopy of live cells. Treatment of *T. b. brucei* with human serum suggests two distinct cellular mechanisms are associated with cell lysis. Using freshly collected, high specific activity human serum, we observed that *T. b. brucei* rapidly undergoes morphological changes appearing "kite-shaped" prior to cell lysis. The morphology of *T. b. brucei* incubated with low specific activity human serum was dramatically different. Three conditions produced low specific activity human serum: 1) The presence of elevated levels of haptoglobin, 2) prolonged storage at 4°C, and 3) brief incubation at 62°C. Using low specific activity serum, we observed the gradual formation of a large cytoplasmic vacuole and a delay in trypanosome killing, which immunofluorescence microscopy confirms is not the cell lysosome. These studies support the hypothesis that human serum killing of *T. b. brucei* may require the activity of multiple proteins, and that one of these proteins may be selectively inactivated by haptoglobin, heat treatment or storage, resulting in the distinct morphologies observed. Understanding this mechanism will allow us to better understand human innate immunity.

Attuning to Positive Social Cues as an Effortful Process for Socially Anxious Individuals

Raha Sabet
Dr. Michelle vanDellen, Department of Psychology, University of Georgia

The purpose of this project is to investigate the impact of anxiety on responses to social threat. In general, people attend to positive cues after social threat. However, these attention processes may not operate similarly for people at varying levels of social anxiety. At low levels of social anxiety, attuning to positive cues should occur naturally and should not involve effort. However, at high levels of social anxiety, attending to positive social cues may be effortful. This project involves two studies designed to investigate whether the regulation of positively oriented social attention requires effort by people high in social anxiety. Both studies will be conducted on male and female college students. In each study, I will measure trait social anxiety and manipulate the extent to which participants' ability to exert effort is reduced. Study 2 builds on Study 1 by including a manipulation of social threat such that some participants will be led to believe that they will be evaluated while reading a passage from Shakespeare's Hamlet. In each study, attention to positive social cues (e.g., attention to happy faces) is the primary dependent variable. All participants will be fully debriefed.

Reducing Water Usage by Repowering Plants in Georgia

Hank Schwartz, Roosevelt @ UGA
Dr. Laurie Fowler, Odum School of Ecology, University of Georgia

From 1970 to 2009, the metro Atlanta population exploded from 1.7 million to 5.3 million, and during the same period, farming irrigation in Georgia has increased from 200,000 to 1.4 million acres. The competition for resources is evident: a 2007 drought led to a decrease in $1.3 billion of economic output, and Georgia currently has the largest proportion of imperiled freshwater fauna in North America. Additionally, based on a 2009 U.S. federal court ruling, Atlanta will not be able to make

withdrawals from Lake Lanier past 1970 levels, effectively reducing the city's water supply by half. In order to dramatically reduce water consumption, certain aged power plants in Georgia should be "repowered." When an existing plant is repowered, boilers and generators are either replaced or revamped in order to increase efficiency, reduce emissions and lower water requirements by up to 97%. A review of scholarly journals, university research, business publications and other state water strategies indicates that repowering plants is the fastest and most efficient solution to Georgia's water shortage. While the initial cost will be significant, the payback on the investment will be achieved within four to six years. Considering that the power requirements are highest during the driest months of the year, repowering certain strategic plants in Georgia would reduce the adverse effect of droughts and ensure continued economic growth for the region.

A Cold Calculus: Spending in K-12 Education

Matthew Seitz, Roosevelt @ UGA
Dr. Catherine Sielke, Department of Lifelong Education, Administration & Policy, University of Georgia

Funding for Georgia's K-12 education system has plummeted by $4.3 billion over the last decade, $2.3 billion in the last two fiscal years alone. With revenue projections looking bleak, further cuts will be necessary in the future. Districts have already taken advantage of "easy" cuts; their task now is to make tough, practical decisions that minimally inhibit student opportunity. This paper scrutinizes the evidence for and against four common budget remedies—teacher pay reductions, increased property tax rates, increased class size, and targeted cuts of upper-level and non-core classes—for cost-effectiveness, with an end goal of helping school districts manage funds available to them until tax revenues increase. Evidence on cost-saving measures from the public and private sectors is considered to harmonize the efficient methods of the business world with the "education at any cost" mentality that has dominated public life in recent decades. An across the board wage decrease to teachers and administrators in conjunction with an increase in local property tax is recommended as the most cost-effective solution. This is a temporary measure—both educator salaries and local millage rates will need to be reassessed once the economy recovers, and longer-term policies are enacted. Until then, our school systems must keep all options—however unpopular—on the table.

Every Man a King: Robert Penn Warren, Populism and Contemporary American Politics

Matthew Sellers, CURO Scholar, CURO Summer Fellow & Roosevelt @ UGA,
Dr. Hugh Ruppersburg, Department of English, University of Georgia

Robert Penn Warren writes extensively about politics and political personalities, and that discussion leads him to consider populism's impact on the southern political landscape. From the tobacco wars in *Night Rider* to his representation of demagoguery in *All the King's Men*, Warren examines the circumstances surrounding the genesis of populist movements, delves into the personalities that drive them, and speculates about their consequences and demise. In light of recent developments in American politics—the rise of the Tea Party, grounded in conservative populism, and the election of Barack Obama, founded on liberal populism—Warren's novels' treatment of populist politics takes on new significance. Using Warren's literary evaluation of populism, created in his novels and poetry, this thesis will analyze the significance of populism to contemporary American politics. It will draw comparisons between political rhetoric as presented in Warren's novels with that found in contemporary political speeches; the characterization of the crowd with the media's characterization of populist movement members; and the characters of the figures who lead Warren's fictional movements with the real leaders of movements, like Organizing for America and the Tea Party. This comparison will elucidate the role populist movements play in shaping policy and politics by contrasting Warren's vision of populism with the reality of populism in government. The thesis will

conclude with a discussion of the conflict between institution and individual, highlighting efforts to reform ethics in government using Willie Stark as an exemplar, as well as considering the long-term sustainability of populist movements.

Ty1 Element Antisense RNA Activity from Natural *Saccharomyces* Isolates

Alexander Sevy, CURO Scholar
Dr. David Garfinkel, Department of Biochemistry & Molecular Biology, University of Georgia

Retrotransposons are a class of mobile DNA elements found in most eukaryotic genomes. These elements replicate through an RNA intermediate and insert at various locations in the genome. Ty1 retrotransposons are present in *Saccharomyces cerevisiae* and related species, such as *S. paradoxus*. *S. cerevisiae*, otherwise known as baker's yeast, is an effective model organism for studying retrotransposons because of the powerful genetic and molecular systems developed for this organism. Ty1 elements produce long antisense RNAs that inhibit transposition *in trans* and confer copy number control (CNC). We hypothesize that Ty1 elements present in *S. cerevisiae and S. paradoxus* isolates contain sequence polymorphisms that affect antisense RNA synthesis, stability or function. Therefore, genomic Ty1 element sequences recovered from selected *Saccharomyces* genomes were assessed for their ability to confer CNC, using a test strain carrying a genetically marked Ty1*his3-AI* element. DNA sequence analysis is underway to determine the location of polymorphisms within the Ty1 CNC region. Future work will determine if the Ty1 polymorphisms affect antisense RNA expression or function. Since HIV and other retroviruses have a life cycle that is closely related to Ty1, mechanisms regulating Ty1 transposition may also inhibit retroviral replication, and lead to novel therapeutic approaches.

The Evolution of Aging in *Saccharomyces cerevisiae*

Sylvia Shin
Dr. David Hall, Department of Genetics, University of Georgia

Understanding aging remains a central question in biology; however, it is often ignored in microbes. So yeast (a "model organism" in biology) has proven to be exceptionally important in this study because it combines the advantages of microbes, while also being a eukaryote. In my project, I am addressing two questions to determine whether, at an optimal level, mutations will increase and/or decrease the lifespan of the budding yeast, *Saccharomyces cerevisiae*. First, I am determining whether a particular lab strain shows evidence for an evolved, intermediate aging rate. Second, I am addressing whether the aging trait can rapidly respond to selection. To answer the first question, I cultivated on agar media, and then transferred to liquid media, a set of 149 mutation-accumulation lines, and then determined how random mutations alter the pattern of aging. If most mutations have similar effects on aging, this indicates selection has favored extreme, as opposed to intermediate, aging. To answer the second question, I am examining whether the same strain has responded to many rounds of selection for extended aging. Using a Bioscreen C (Thermolab system), an automated incubator/spectrophotometer, I will be measuring the growth curves. For the results, I will use Excel® to create mortality curves with the collected data. I will compare the results of the 149 lines to the ancestors, deduce a pattern and compare the effects of the mutations in different media. Showing that aging is an evolved phenotype will demonstrate that it is an important trait in microbes, similar to other organisms.

Human Embryonic Stem Cell Derived Neurons as Biosensors for Neurotoxins

Anuj Shukla
Dr. Steven Stice, Department of Animal & Dairy Science, University of Georgia

Many environmental toxins can cause serious damage to the human central nervous system. Neurotoxins can generate reactive oxygen species (ROS) which damage important signaling mechanisms in the body's neural network. Currently, there is a need for a human cell-based sensor that utilizes functional biology to detect hazardous neurotoxins and their ability to produce ROS. Human neural progenitor cells (hNPs) derived from human embryonic stem cells (hESCs) were successfully differentiated into neurons in our lab; these hNPs provide an unlimited source of differentiated neurons which have the potential to be reliable human cell-based sensors. In fact, neurons derived from hESCs have shown to be remarkably accurate for toxicological applications compared to the results of similar in vivo studies. Therefore, the purpose of this study is to develop a hESC-derived biosensor by analyzing the functional effects of various neurotoxins on hNPs and hNPs differentiated into neurons. ROS generation in the neurotoxin-treated hNP and neuronal cultures was detected by the addition of a novel dye that only fluoresces in the presence of ROS. After addition of Tempol, a known ROS quencher, the fluorescence intensity of the neurotoxin-treated cultures decreased to control levels. We are currently testing other functional effects of the neurotoxins in correlation with ROS production. For example, the differentiation potential of the neurotoxin-treated hNPs is being analyzed by staining for neuronal marker proteins normally present during differentiation. Our results thus far show that hNPs and neurons derived from hESCs can be potent sensors for ROS generating neurotoxins.

Italian Futurism and Interventionism

Jennifer Skinner
Dr. Nell Andrew, Lamar Dodd School of Art, University of Georgia

The Futurists were an avant-garde group of writers and artists who originally advocated for a break with tradition. Their leader F. T. Marinetti promoted the push towards modernity in his "Futurist Manifesto," wherein he described the experience of man mixing with machine. In addition to machinery, they believed violence represented the true spectacle of a frenetic and unstable urban life. Like most of Europe in 1913-14, the Futurists knew that war was approaching and advocated in their work for Italian intervention. These interventionist works are the turning point for the Futurists, and my paper argues that these works anticipated the upcoming rise in fascism, for which the Futurists became supporters and propagandists. I will show how the Futurists began to take little steps towards fascism through their artworks and their writings, and I will also track how the Futurists increasingly became a vital gear in the fascist machine. In addition, my argument demonstrates how under the right circumstances an avant-garde art movement can easily become a proponent in a nationalist dictatorship. This element of my argument is essential for understanding why a liberal artistic movement became a supporter of a conservative political movement. Finally, I will analyze the role the Futurists play in Italian Fascism and how their art prolonged the life of the Italian Fascist government. Ultimately, the Futurists turned to fascism because of their interest in Italian intervention.

Is Distraction an Effective Method for Tolerating Distress?

Laura Smart, CURO Summer Fellow
Dr. Rheeda Walker-Obasi, Department of Psychology, University of Georgia

Distraction is widely cited in the literature as a method for tolerating distress; however, the evidence on the subject is inconclusive. Previous studies investigating the efficacy of distraction have used different methods of inducing distress and different types of distracters, making

comparisons between studies difficult. The current study utilized a Cold Pressor Test (CPT) in order to induce stress in undergraduate participants. The CPT has been used in a plethora of studies and is an empirically validated method for inducing stress in the laboratory. It involves submerging the participants' non-dominant hands in 0-1˚ C water for three minutes in order to produce physiological arousal. Changes in blood pressure and heart rate were measured in order to assess participants' physiological responses to stress. Participants were randomly assigned to either a control or a distraction group for the task. The participants in the distraction group were allowed to watch a three minute film clip that has been empirically validated as positive-affect inducing, while the control group was not given any distraction. Data will be analyzed using a multiple analysis of variance to determine if the participants who engaged in the distracting task during the CPT showed less change in physiological arousal (as measured by heart rate and blood pressure) from baseline as compared with the control group. If the hypothesis is correct, it will provide evidence that distraction is an effective method of preventing increases in physiological arousal during times of distress.

In the Image of the Artist
Daniel Smith
Dr. Asen Kirin, Lamar Dodd School of Art, University of Georgia

All creations inevitably reflect some aspect of their creators. To better understand the underlying nature of art, I spent the past several months investigating the most dramatic instance of this phenomenon as evidenced in self portraiture. I researched a number of artists. I looked at Albrecht Durer's super-realistic, divine renditions; Michelangelo's monumental conceits; Rembrandt Van Rijn's humble and vulnerable paintings; and a number of other artists' works and writings. I questioned these masters' artistic philosophies and methodologies and constructed my own in a series of self portraits. As a genre, self portraiture removes all variables from the creative process except the basic reproduction of the image and likeness of the artist. This approach towards art is one of the earliest, and in its simplicity it is the most powerful. Ultimately, I reproduced my own image in a series of images, which hopefully communicate more than mere words. In this photographic series, I used both the integrity of film and the flexibility of digital technology. Some images I printed simply in the darkroom. Other images I photographed in parts and later compiled, distorted or fabricated the individual elements on a computer. Through these alternatively traditional and unconventional means, I compiled a number of realistic and surreal images. In constructing each image, I paid careful attention to symbolism, pose and art historical relevance. My images speak for themselves, presenting my own ideas about self portraiture, yet echoing the conceits of numerous self portraitists throughout history.

How Leadership Makes a Difference: The Predictive Role of Managerial Leadership Competencies in a Multi-National Company
Rebecca Stein
Dr. Karl Kuhnert, Department of Psychology, University of Georgia

Increasing size of organizations, coupled with the information/technology revolution and an ever-expanding global environment, has created complex organizational systems, which are impossible to fully grasp or completely control (Kotter, 1982b). Furthermore, senior executives of these large companies are expected to provide leadership in the midst of this complexity, and are held responsible for organizational outcomes. This potent environment demands reliable information to assist organizations in the development of their leaders. Unfortunately, many important questions remain unanswered. Do leadership competencies of mangers predict critical organizational outcomes? If so, which leadership competencies are more important than others? Three thousand managers from a Fortune 500 company were rated on 9 leadership competencies and performance and business objectives were collected. Analyses were conducted to determine whether leadership competencies were related to important business outcomes. Possible explanations for the results are discussed and recommendations for future research are proposed.

Changing Environments: Effect on Extinction Time and Distribution

Theresa Stratmann
Dr. John Drake, Odum School of Ecology, University of Georgia

In an era of increasing species extinctions, it is vital to understand processes of population extinction in hopes of eventually predicting and preventing them. We used the aquatic ectotherm, *Daphnia magna*, as a model organism to study how deteriorating environmental conditions caused by temperature change affected the populations' extinction times and distributions. Three sets of twenty-four chambers of *Daphnia* ($N_0 = 20$) were subjected to temperature regimes according to three treatments: 1) increasing temperature, 2) decreasing temperature by 0.1ºC/day from 20ºC and 3) constant 20ºC temperature (control). Each treatment pushed temperatures toward a different end of the *Daphnia*'s thermal tolerance. Therefore, we hypothesized that the treatments would alter extinction risk differently: if one increased risk, the other would decrease it. In contradiction to these predictions, inspection of the data with the Cox proportional hazards regression and linear models showed that temperature treatments did not explain differences in survival time. Further analysis showed that random contamination by algae determined extinction time, and chambers subject to temperature manipulations became contaminated significantly later than control chambers. As a result, the temperature treatments indirectly affected survival. The treatments also resulted in different distributions of extinction times. The decreasing temperature treatments had a distribution that was shifted to the right, which means that some populations persisted much longer than most. This controlled laboratory experiment allows us to gain understanding of mechanisms that can cause population extinction, and we are now working to put our findings into such a context.

Presence of Newcastle Disease through Immunohistochemistry in Tissues of Chickens Diagnosed with the Disease in the Field

Lauren Sullivan
Dr. Corrie Brown, College of Veterinary Medicine, University of Georgia

Newcastle disease is a familiar problem to most poultry producers. Many strains of the virus exist, and can cause a wide range of clinical signs in chickens. The most serious forms of the disease are foreign to the US. The less severe forms of the disease are thought to cause mild to moderate respiratory problems, leading to decreased productivity. Consequently, many producers vaccinate their birds. Often chickens with respiratory problems are submitted to diagnostic laboratories, where they are diagnosed with Newcastle disease through identifying the presence of virus. In our laboratory, we are examining the respiratory tracts through histology and immunohistochemistry. First, heat-induced antigen retrieval is performed in a buffer solution; then a commercial agent is used in a blocking procedure in order to ensure the specificity of the antigen. Lastly, both primary and secondary antibodies are applied in order to visualize the binding reactions. Although there is evidence of respiratory damage noted morphologically, in fact, very few of the tissues have Newcastle disease virus evident through immunohistochemistry within the inflamed tissue. Consequently, we believe that many of the diagnoses of Newcastle disease are erroneous, and the viral identification was of the vaccine virus. Further investigations are warranted to confirm and expand upon these findings.

Linguistic and Musical Coherence

Ai Taniguchi
Dr. Paula Schwanenflugel, Department of Educational Psychology & Instructional Technology, University of Georgia

The comparative study of linguistic and musical semantics has gained popularity in recent years, but researchers have yet to explore the potential commonalities in the processing of context-

based meaning of language and music. The purpose of this research is to investigate such connections by testing the effect of contextual coherence of music on linguistic memory. "Contextual coherence" in this study has been designated as the process of individual segments connecting to form a meaningful whole. In language, this is the inferencing process; the musical parallel of it is the periodic structure, in which two musical phrases must complement each other in structure or function to create coherence. Two poems were selected, and two versions of music were assigned to each--one coherent, and one incoherent. The coherent piece abides by the periodic structure defined above. The incoherent piece was achieved by rearranging the coherent piece so that adjacent phrases do not form ideal periods in terms of material and/or function. 40 healthy college students listened to two songs, one coherent and one incoherent, and recalled the words of each poem. Participants recalled fewer words in the incoherent version of the songs than in the coherent version, thus potentially indicating that musical incoherence disrupts memory for poetry. This may imply that coherent musical context acts as a scaffold to linguistic comprehension. The significance of this study lies in the possible revelation of processing commonalities of linguistic and musical discourse, with potential applications in facilitating first and second language instruction.

Intramolecular Friedel-Crafts Cyclization with Arylsilanes

Stephen Thompson, CURO Summer Fellow
Dr. George Majetich, Department of Chemistry, University of Georgia

An electrophile adds to the ipso carbon atom bearing the silyl substituent of an aryl silane to generate a carbocation stabilized by the silicon's well-established β-effect; the loss of the trimethylsilyl group produces a product in which the electrophile has replaced the silyl group. Electrophilic aromatic substitution reaction of aryl silanes are widely known and include halogenations, Friedel-Crafts alkylation, Friedel-Crafts acylation and nitrations. Not surprisingly aryl silanes are useful to prepare functionalized arenes. Majetich et al. showed that a Lewis acid-activated dienone (A-ring) can react with an arene (C-ring), undergoing cyclialkylation to produce a cyclopheptane (B-ring). Application of Friedel-Crafts cyclialkylation to silyl substituted arene-dienone systems allows for exploration of the reactivity of the silyl moiety. Treatment of this system with a Lewis acid under kinetic control should produce the cycloheptane while not affecting the silyl substituent on the arene ring. The introduction of the silyl functionality would potentially allow a handle for further transformations, leading to more diverse tricycles. The synthesis of the arene-dienone began with transmetalation of o-bromotoluene and the addition of chlorotrimethylsilane. The resulting aryl silane was then treated with NBS to form benzylic bromide. 6-methyl-3-ethoxycylcohex-2-en-1-one was then alkylated with bromide using the Stork-Danheiser protocol and then reacted with vinylmagnesium bromide to furnish the dienone. Treatment with TiCl4 only produced the tricycle in which the trimethyl silyl group had been lost. However, using BF3•Et2O as the Lewis acid produced cyclialkylation and retention of the silyl moiety. Re-exposure of this product to Lewis acid catalyst resulted in protodesylation.

The Effects of Lutein and Zeaxanthin Status and Macular Pigment Optical Density on Neural Efficiency

Sarah Thorne
Dr. Lisa Renzi, Department of Psychology, University of Georgia

Macular pigment is comprised of dietary carotenoids lutein and zeaxanthin that are intercalated within the macular region of the neural retina. Macular pigment has been shown to prevent retinal degeneration and improve visual function (Beatty et al, 2000; Wooten & Hammond, 2002). Although lutein and zeaxanthin are found in highest concentration in retinal tissue, they are not unique to the retina. For example, lutein and zeaxanthin have been located in the frontal and occipital cortices of the brain (Craft et al, 2004). Whether lutein and zeaxanthin also protect cortical tissue and enhance cortical function is an open question. The hypothesis of the current study is that the brain benefits from the protective effects of

lutein and zeaxanthin, resulting in better cognitive performance and increased neural efficiency. Macular pigment density was measured in both young and older adults non-invasively via heterochromatic flicker photometry. Given the fact that lutein and zeaxanthin in the neural retina are known to correlate with lutein and zeaxanthin cortical levels, macular pigment density was used as a biomarker of cortical lutein and zeaxanthin and was compared to performances on cognitive and visual measures used to determine neural efficiency. Cognitive measures consisted of a rapid categorization task and a standard battery used to evaluate cognitive vitality. Neural efficiency was measured via the temporal contrast sensitivity function (tCSF) and a visual masking task. Preliminary evidence shows that macular pigment density is correlated with performance on visual and cognitive measures, suggesting that lutein and zeaxanthin are related to neural efficiency.

The Role of Indoleamine 2,3-Deoxygenase in CD8 T Responses to Influenza Infection

Jeffrey Tran
Dr. Kimberly Klonowski, Department of Cellular Biology, University of Georgia

Current influenza vaccines are designed to generate antibody-specific immunity against predetermined strains of virus and are ineffective in protecting against novel or emerging strains. Targeting conserved T cell epitopes can provide protection against unexpected circulating strains of influenza; however, this protection wanes over time. Thus, understanding and exploiting the mechanisms involved in CD8 T survival and maintenance may aid in the development of a successful anti-influenza vaccine eliciting cell-mediated immunity. Indoleamine 2,3-deoxygenase (IDO) is a tryptophan catabolyzing enzyme up regulated following influenza infection, which suppresses naive T cell proliferation and induces the apoptosis of T cells. To determine whether IDO suppression may be a viable option to enhance T cell immunity to influenza infection, wild type and IDO knockout mice were infected with influenza, and the number, frequency and function of the influenza-specific CD8+ T response were monitored over time. IDO knockout mice demonstrated a more robust virus-specific T cell response to influenza in the lung and lung airways (the site of viral replication) compared to wild-type during the early effector phase of the response. However, both groups of mice harbored similar levels of influenza-specific CD8 T cells at later stages of the immune response. Future experiments will determine whether an IDO deficiency alters the phenotype and function of these memory cells when rechallenged with influenza. Together our data provides a detailed picture of how IDO regulates T cell responses to respiratory infection.

Cuticular Pheromones and Fire Ant Queens: Smells like Mom

Waring Trible
Dr. Ken Ross, Department of Entomology, University of Georgia

The Red Imported Fire Ant (RIFA), *Solenopsis invicta*, has been the subject of intense research because of its status as a serious invasive pest. One major emphasis of study in ant biology focuses on the question of how pheromones (chemical signals) are used for communication. This question applies especially to the polygyne (multiple-queen) and monogyne (single-queen) social forms of RIFA. Previous research has found strong genetic control for the organization of a RIFA colony into polygyne or monogyne societies. These two social forms feature specific genotypes at a single Mendelian locus and phenotypic differences in behavior, physiology and biochemistry. We studied the process by which colonies of each form accept new queens. Workers in queenless colonies will accept a new queen in certain circumstances, but polygyne workers only accept into their colony polygyne queens, and monogyne workers only accept into their colonies monogyne queens. Preliminary studies indicated that this behavior may be influenced by chemicals. We first showed that fresh polygyne and monogyne corpses elicited the same specific worker responses of queen acceptance and rejection according to queen genotype as do live queens, demonstrating that the queens are not accepted on a behavioral

basis. We then showed that chemically extracted queen pheromones, deposited onto inanimate surrogates (paper wicks), also elicited appropriate worker ant discrimination behavior. These results support the hypothesis that worker discrimination behavior is elicited by chemical differences between workers of the two social forms.

"I've got the rhythm, she's got the blues." Relations Between Temperament, Maternal Stress and the Development of a Sleep-Wake Rhythm in Infancy

Vivien Tsou
Dr. Anne Shaffer, Department of Psychology, University of Georgia

Although there is extensive literature on factors that may influence an established sleep-wake rhythm in adulthood, there is little published on factors that may influence the characteristics of developing sleep-wake rhythms in infancy. In this study, we will examine the situational (e.g., maternal stress, environmental cues) and dispositional (i.e., temperament) characteristics that may influence the onset and characteristics of a sleep-wake rhythm in infancy. We hypothesize that increased maternal stress and difficult temperament will lead to later sleep-wake rhythm onset and poorer sleep-wake characteristics. Data collection is currently underway. Approximately 30 mother-infant pairs will be participating in this longitudinal study. When their infants are three and six months of age, mothers will complete measures about themselves (i.e., Life Experiences Questionnaire, Daily Hassles Scale) and their infants (i.e., Infant Behavior Questionnaire, sleep and feeding diaries). At four and five months, mothers complete sleep-wake characteristics of interest, including presence of a circadian rhythm, infant sleeping quarters, longest sleep duration, number of awakenings and total nocturnal sleep time. From this data, we expect to see differences in onset and characteristics of the sleep-wake rhythm predicted by maternal stress or infant temperament and how the relation between situational and rhythm characteristics are moderated by infant temperament. We will conduct bivariate correlations to assess relations between maternal stress, maternal contact, infant temperament and infant sleep characteristics. Multiple regressions will examine how maternal factors predict sleep-wake rhythm onset and characteristics, and temperament will be examined as a potential moderator of this relation.

Preserving Georgia's Waterways: Tackling Interbasin Transfer in Georgia

Pranay Udutha, Roosevelt @ UGA
Dr. Laurie Fowler, Odum School of Ecology, University of Georgia

Georgia's population is unevenly distributed—almost 60% lives in metro Atlanta. Furthermore, Atlanta has consistently displayed one of America's highest growth rates over the past decade, causing a disproportionately concentrated demand for water by Metro Atlanta. This phenomenon has generated severe water management issues, resulting in increased interbasin transfers (IBT). Metro Atlanta spans several narrow river basins of differing elevations, rendering water transfer from higher basins into lower basins cheaper than pumping water back up to its source basin. Without careful management, IBTs may inflict substantial, sometimes irreversible, damage to ecosystems of both recipient and donor basins. IBTs facilitate introduction of non-native species to each basin, degrade water quality and decrease water supply for some areas. Currently, no effective comprehensive policy regarding IBT in Georgia exists. This paper recommends a per acre-foot tax on IBT. The mechanism of action is straightforward, internalizing spillover costs and decreasing IBT profitability, and precedent for such proportional taxes already exists. An analysis of economic literature, judicial reviews, and policies of neighboring states facing similar water management issues indicates that this is the most efficient and effective policy for controlling IBT. This policy can be expected to stem further species invasion and water quality deterioration.

Measurements of Inhibition: The Relation Between the Eriksen Flanker Task and the Stop Signal Task

Litty Varghese, CURO-BHSI Participant
Dr. Jennifer McDowell, Department of Psychology, University of Georgia

Inhibition is an important behavioral ability that is essential for proper functioning. When it deteriorates, it leads to problems that could result in clinical disorders or psychopathology. There are many tasks, which vary across laboratory and field of study, that test inhibition. Knowing how performance on these varied tasks is related, and which ones provide unique information, would help researchers reduce the number of tasks used in studies. Performance can be measured by the proportion of correct and incorrect responses, as well as the amount of time it took to respond correctly and incorrectly. One common test is the Eriksen Flanker task, in which subjects have to focus on the direction of one central arrow amidst flanking distractor arrows (which can face in any direction) and have to respond appropriately. Another measure of inhibition is the Stop Signal task (SST) in which subjects have to resist a primed motor response when they see a stop signal. The hypothesis is that the results of the two tasks will be highly correlated. Performance on the Flanker task will predict outcomes on the SST in terms of error rates and reaction times, with poorer performance being indicative of decreased inhibition. The study was conducted on 100 undergraduates at the University of Georgia. Future researchers will benefit from these findings as it will enable them to optimize their studies by conducting tests that are uniquely informative, while still being able to predict performance on similar tasks based on the high correlation rates.

Nutrient Enrichment Effects on Detrital Food Resources in Streams: Implications for Microbes and Consumers

Stenka Vulova
Dr. Amy Rosemond, Odum School of Ecology, University of Georgia

Excessive nutrient enrichment has become the primary water quality issue for most of the freshwater and coastal marine ecosystems in the world. In this study, we examined nutrient enrichment effects on detrital food resources of stream consumers. We measured nutrient content (nitrogen (N), phosphorus (P) and carbon (C)) of two resources utilized by stream detritivores: fine particulate organic matter (FPOM) and leaves. We tested whether nutrient enrichment in streams affects detrital nutrient content and determined the implications for stream consumers by comparing samples of FPOM and leaves collected from a reference stream and experimentally enriched stream (with N and P) at the Coweeta Hydrologic Laboratory. Reductions in carbon to nutrient ratios (C:N, C:P) indicate higher nutrient content and food quality for consumers. We found C:P became reduced in the nutrient-enriched stream for both leaves and FPOM (approximately 38% reduction in both cases). We compared the C:P food requirements of shredders (which feed on leaves) and collectors (which feed on FPOM) to observed C:P values and found that nutrient enrichment decreased P limitation for shredders and enhanced C limitation for collectors. Thus, runoff of nutrients to streams would increase production of shredders and potentially reduce production of collectors, which contribute differentially to ecosystem services provided by streams. Our results help lay the groundwork for understanding how excess nutrients entering streams will differentially affect food quality for different groups of stream organisms, with implications to ecosystem function.

Grand Strategy as it Pertains to the Korean Peninsula

Edward Wells, Jr., CURO Apprentice
Dr. Brock Tessman, Department of International Affairs, University of Georgia

The current diplomatic gridlock and military tensions on the Korean Peninsula are a product of the manner in which the key external actors in the region—China, Japan, Russia and the United States—define their national interest. All of the non-state actors involved have publicly claimed to support both non-proliferation and the reunification of the North and the South, yet their actions sometimes prove otherwise. Though leaders from these states may publicly

declare that they are motivated by interests such as peace and principle, their actions seem typically driven by a fundamental desire to maximize power and profit, even if it means delaying the reunification of the two Koreas. This difference in words and actions has led to a lack of progress in achieving the set goals of non-proliferation and reunification. The paper acknowledges that states conceive their national interests based on the framework of the 4Ps: power, peace, prosperity, and principles. Through analysis of diplomatic documents, official speeches and objective scholarly sources, it becomes clear that while each actor may publicly define its national interest in terms of peace and principles, many leaders ultimately make foreign policy decisions based on power and prosperity-based interests. Currently, the stalemate on the Korean Peninsula persists because the key external powers calculate that their power and prosperity are best served by promoting the status quo instead of reunification. This reality has kept the six parties involved in the Korean peninsula, despite over a half-century of negotiations, conflicts and compromises, from coming up with a solution for peaceful reunification that is acceptable to all sides.

Breastfeeding Practices among Hispanic Women in Athens

Caroline West
Dr. Susan Tanner, Department of Anthropology, University of Georgia

Breastfeeding is the optimal source of nutrition for newborns, with immediate and long-term effects on infant and maternal health. The numerous benefits, including protection from infant infections and obesity, and promotion of cognitive development and healthy infant growth, are well established in medical literature and government policy. Despite these benefits, national levels of breastfeeding are lower than goals set by US Healthy People 2010. As the fastest growing population in the United States, Hispanics are of particular concern when examining disparities in access to health care and health outcomes. While Hispanic women meet some of the national breastfeeding goals, rates of optimal breastfeeding among this population remain stagnant and low. A review of literature identifies national breastfeeding trends among Hispanic populations, including factors influencing breastfeeding decisions, various barriers women face to initiate and continue breastfeeding and general attitudes and beliefs concerning the practice. Narrative data collected from individual interviews with four Hispanic women in Athens was analyzed to illustrate the prevalence of these breastfeeding trends on a local level. Questions concerning breastfeeding were coded for frequently used phrases, which were subsequently categorized according to trends found in the literature review. Results demonstrate a consistency with national trends, including the common perception of insufficient milk supply and practice of combining breast milk and formula before the optimal weaning age. A comparison between national and local breastfeeding trends provides insight in promotion of healthy breastfeeding practices among Hispanics in Athens and the broader Hispanic community.

Academic Relevancy: A Focus Group Study

Taylor Whelchel
Dr. Christopher Pisarik, Division of Academic Enhancement, University of Georgia

Colleges and universities are under increasing pressure from parents, the government, and the business community to prove that their academic curriculum is relevant. Most of the stakeholders of higher education have well documented positions on why a college education is relevant. For example, the government's prominent position is that higher education is relevant because it perpetuates national economic growth. Faculty members often view academics as relevant because it facilitates social and civic responsibility. However, there is little literature that explores the relevance that college students find in their academic experience. In this focus group study, fourteen students in a life skills class with varying majors, discussed and defined the construct of academic relevance from their perspective. The transcript of the focus group was analyzed using a qualitative coding methodology. Analysis of the data produced two distinct types of academic relevancy—direct and indirect. Each of these types of relevancy was

found to exist in three life dimensions: academics, occupation and personal development. Thus, participants found their academic experience to be relevant in six distinct ways. The results of this study lays the foundation for future quantitative studies that will further analyze this construct of academic relevancy. This is important because it will enable researchers to explore the extent to which academic relevancy has an effect on important constructs such as motivation, persistence, academic performance and psychological well-being.

Clinico-pathological Characterization of Newly Isolated Newcastle Disease Viruses from Dominican Republic, Belize and Peru

Anna White
Dr. Corrie C. Brown, College of Veterinary Medicine, University of Georgia

Newcastle Disease Virus (NDV) is the causative agent of Newcastle Disease, a highly contagious and fatal poultry disease. The virus belongs to the family *Paramyxoviridae*, subfamily *Paramyxovirinae*, genus *Avulavirus*. New strains frequently arise, creating serious transboundary risks. Three NDV isolates from recent outbreaks in Peru (APMV1/poultry/Peru/1918-03/2008), the Dominican Republic (APMV1/chicken/Dominican Republic (Juan Lopez)/499-31/2008), and Belize (APMV1/chicken/Belize (Spanish Lookout)/4224-03/2008) were each characterized by phylogenetic analysis and clinico-pathological assessment. Complete sequencing of the F gene revealed that Peru and Dominican Republic isolates likely belong to a new genotype, while Belize is a member of NDV genotype V, which is commonly circulating within Central and North America. Intra-cerebral pathogenicity indices were 1.88, 1.78 and 1.75 respectively for DR, Peru and Belize. Experimentation was conducted by inoculating groups of 4-week-old, White Leghorn chickens via eye drops containing the three isolates. Subsequent to inoculation, birds were monitored clinically and euthanized sequentially. Tissues were collected for histopathological examination and immunohistochemistry for viral nucleoprotein. Disease was severe in chickens inoculated with all the strains, with each chicken dying before four (Peru, Belize) and six days post-infection (DR), due to acute systemic illness, necrosis of lymphoid tissues and detection of nucleoprotein in multiple tissues.

Business Model Generation and Energy Informatics

Tyler Williamson
Dr. Rick Watson, Department of Management Information Systems, University of Georgia

Sustainability needs to be tightly woven into the thinking of every senior executive if we are to develop a sustainable society. Furthermore, those businesses seeking to capitalize on "the Green Movement" must put sustainability at the forefront of all of their planning and product development. Our goal is to provide business leaders with an energy efficiency oriented framework to allow them to transform their organizations into sustainable enterprises. Through the review of existing literature and professional experiences, we have taken the business model generation canvas (Osterwalder & Pigneur, 2009) and developed a layer to stimulate Energy Informatics (Watson, Boudreau, & Chen, 2010) thinking. Business model generation is a technique to capture the essential features of an organization's business. It addresses such issues as value proposition, sources of costs and revenues, partnerships and customers in a concise and graphical manner. Osterwalder and Pigneur's book has quickly become an international best seller because the technique is powerful and collectively engaging. We have taken the business model generation canvas and created a group collaborative version on Cacoo, which is web-based software for creating diagrams collaboratively. One of the features of Cacoo is the ability to create layers, so we have augmented our initial two-layer model of a blank canvas and key questions with a layer containing questions to provoke Energy Informatics thinking within organizations. The resulting canvas will be made publicly available to advance the development of Green IS.

Diversity of Orchid Fungal Symbionts in Estonian Mine Tailings

Samuel Willis
Dr. Richard Shefferson, Odum School of Ecology, University of Georgia

Nutrient and water availability are two key requirements of plant survival. Mycorrhizal symbioses help orchids subsist in areas with apparently low soil nutrients and water availability—in this case, Estonian mine tailings that contain little more than burnt oil soaked shale and ash. We extracted all DNA in soil samples taken from multiple sites in the mine tailings in both the summer and the fall. The sample size for summer was 25 and the sample size for the fall was 62. We carried out Polymerase Chain Reaction (PCR) on purified DNA samples, and performed gel electrophoresis and Restriction Fragment Length Polymorphism (RFLP) pattern determination. We then sequenced non-identical RFLP patterns and carried out Basic Local Alignment Search Tool (BLAST) searches to determine the organismal composition of the areas. We found 20 unique RFLP patterns for the fall samples and 12 unique RFLP patterns for the summer samples. The dominant organisms found were mycorrhizal fungi in families Thelephoraceae and Cortinariaceae. The overall diversity of mycorrhizal fungi determined by Shannon's Diversity Index shows that for the fall, H=2.33, and for the summer, H=1.84. This is higher than the mycorrhizal diversity in the Brazilian rainforest where H ranges from 1.2 to .87. This is important because although the fungi in the mine tailings only associate with orchids, it shows that mycorrhizal fungi in general may assist in reclaiming and restoring environmentally decimated locations such as mine tailings, landfills and other nutrient poor areas.

Smart Moves: Avoiding Common Investing Mistakes

Munir Winkel
Dr. Swarn Chatterjee, Department of Housing & Consumer Economics, University of Georgia

For investors, the financial world can be overwhelming and confusing. Novice investors have little experience with financial markets. They often do not understand the implications of their actions when it comes to trading stocks, bonds, CDs, mutual funds or index funds. Worse, best-selling books, television hosts and internet articles often provide misleading or inaccurate advice, and investors fall prey to numerous psychological mistakes. We asked: "What mistakes do investors typically make" and "How can investors avoid making those mistakes?" To provide investors with scientific and understandable answers to those questions, we compiled and synthesized information from numerous scholarly articles and books. Based on our preliminary analysis, we found that investors trade stocks too frequently and have their profits unnecessarily eroded by commissions and taxes. The securities investors sell often outperform the securities they keep, and despite claims to the contrary, most investors fail at their attempts to "time the market." We also identified several psychological factors that negatively influence investor behavior, which include hindsight bias, projection bias and loss aversion. Based on our findings, beginning and experienced investors alike can gain confidence and learn which behaviors and trading strategies to avoid. Our findings will enable investors to avoid making costly investing mistakes.

Sexual Attitudes, Media Use and Norms: Sexually Explicit Media and Exposure Effects on Norm Distortion

Courtney Witt
Dr. Tom Reichert, Grady College of Journalism & Mass Communications, University of Georgia

This study sought to explore the relationships between two personality variables (sexual self-schema, sensation seeking), consumption of media with both light (e.g., Maxim magazine) and heavy (e.g., pornographic websites) sexual content, and respondents' perceptions of social

sexual norms. Both personality variables are related to a variety of sexual attitudes and behaviors, and therefore should predict exposure to sexual media. Additionally, a link has been shown to exist between pornography use and distorted perceptions of sexual practices (e.g., infidelity, group sex), such that sexual media use should be positively associated with estimates of sexual normative behavior. With this literature and these concepts as guides, an extensive online survey was developed that measured both personality concepts, sexual media exposure, and a range of sexual practices. Participants (N = 314), consisting of a convenience sample of female and male undergraduates at the University of Georgia, completed the survey with anonymity. Although the analyses are not yet complete, preliminary results suggest that both personality variables are related to sexual media use. More important, both variables and sexual media use are linked to inflated perceptions of sexual behavioral norms, such that participants who score high on these variables also perceive sexual activity to be at higher levels than participants with low scores. These findings are important because they show that exposure to sexually explicit media, even that which appears in popular magazines and network television, can influence perceptions about sexual practices that may ultimately influence behavioral expectations and outcomes.

Increasing Enrollment of Eligible Children in Georgia's Medicaid and CHIP Programs

Abby Wong, Roosevelt @ UGA
Dr. Angela Fertig, Department of Public Administration & Policy, University of Georgia

In 2010, approximately 193,000 children in the state of Georgia were eligible for either Georgia's Medicaid or CHIP program, PeachCare for Kids, but were not enrolled. The state of Georgia has an obligation under the newly implemented provisions of the Patient Protection and Affordable Care Act (PPACA) and the Children's Health Insurance Program Reauthorization Act of 2009 (CHIPRA) to increase the take-up of children into Medicaid and PeachCare for Kids. The objective of this research is to compare various policy alternatives for the implementation of a more rigorous enrollment program in Georgia. Through a comparative analysis of three policy alternatives currently being employed in other states, Express Lane Eligibility (ELE) is found to be the best policy option for the state of Georgia based on three criteria: cost, implementation feasibility and enrollment increases. Specifically, the Georgia Department of Human Services, through the authority granted to state Medicaid and CHIP agencies under Sec. 203 of CHIPRA, should utilize eligibility verification from other public programs, such as Supplemental Nutrition Assistance Program (SNAP), for Georgia's Medicaid and CHIP applicants. Enrollment increases will afford low-income children access to primary care physicians and preventative services that will not only avert the development of costly, chronic illnesses in the long-term, but also preempt the incurrence of high, uncompensated health care costs for the state of Georgia in the short-term.

Representations of the East German Secret Police in Contemporary German Literature

Laura Wynn, CURO Scholar
Dr. Martin Kagel, Department of Germanic & Slavic Studies, University of Georgia

The East German Secret police have long intrigued people because of their secrecy and the way in which they pervaded the lives of East Germans. It was estimated that at the end of the 1980's more than one in seven East Germans was either employed by the East German Secret Police or was asked, cajoled or coerced into becoming a confidential informant. The stories of how the Stasi, as they were commonly known, ruined the lives of normal citizens seeking a way to voice their opinions has become infamous worldwide, and many memoirs and journalistic pieces have delved into these issues. In her novel *Heute wär ich mir lieber nicht begegnet* (*The Appointment*), Nobel-prize winning novelist Herta MÃller looks deeper into the impact that the secret police in the eastern bloc had on its citizens. The novel, which has heretofore been largely ignored in favor of her more overtly political works, follows a woman whose appointments with the Secret Police in Romania demonstrate the

Stasi's ability to trap citizens without having to physically imprison them. The role that literature plays in adding to the discussion of the secret police in the Eastern Bloc is one of showing the confusion and terror that accompanied the lives of those who dared to oppose the strict rules of the communist regime. It is through literature that the Stasi come alive, not merely as a government bureaucracy, but as a living being which lay at the heart of East Germany.

Sanctity as a Means of Conservation: Tongariro National Park, New Zealand
Allegra Yeley
Dr. Fausto Sarmiento, Department of Geography, University of Georgia

Thousands of mountains across the world are sacred to many religions and societies. Additionally, mountains contain natural resources that sustain millions. Because these landscapes are spiritually significant one may assume that their protection is guaranteed. However, anthropogenic activity endangers both the natural and cultural aspects of mountain environments. In New Zealand, the Māori term for "sacred mountain" is *maunga tapu*. Tongariro National Park (TNP) is located on the North Island of New Zealand and is home to the sacred peaks Tongariro, Ngauruhoe and Ruapehu. In 1887, TNP became the first national park in New Zealand. In 1990, it was designated a UNESCO World Heritage Site. The sacred mountains are a popular tourist destination and an important source of drinking water and geothermal energy. I examined Māori and Pākehā (non-Māori) conservation methods and the effect of the mountains' spiritual significance on conservation practices in TNP, which is evident in the park's very existence. The park was created because the mountains were sacred and has protected them for 124 years. My methods consisted of literature review and interviews with academics and scientists in New Zealand. I found that Māori tribes, scientists and other actors are concerned with the high level of tourist traffic in TNP, which may harm the ecosystem and sacred sites. Although the mountains may be sacred only to Māori, clearly labeling them "sacred" may persuade others to respect the sanctity of the environment. Effective conservation in TNP will rely upon equal consideration of economic, environmental and spiritual factors.

Exploring the Life and Technique of Michael Chekhov
Jacob Young, CURO Summer Fellow
Prof. George Contini, Department of Drama & Theatre, University of Georgia

Michael Chekhov was a Russian actor and theatre theorist who lived during the early 1900s. His technique placed more emphasis on the actor's use of imagination and physicality than the naturalistic theatre of his day. Because of this difference, he was marked as a revolutionary mystic by the Russian government and was forced to flee the country to save his life. He traveled across Europe and finally fled to the United States. He died leaving behind only two autobiographies in Russian and a single training manual. The purpose of this research is to present the history of Michael Chekhov and his acting technique in the style of a solo performance. The performance will explore Chekhov's method of teaching as well as his method of acting, focusing specifically on the use of gesture to create and develop a character. Research has been gathered abroad at the international Michael Chekhov workshop in Windsor, Ontario, under the instruction of experts in Michael Chekhov's system of acting, including his last living student. Additional research was conducted in the Michael Chekhov archives of Windsor University. The results of the research are in mid-creation. The production is currently half-way written and is entering the rehearsal process now. The goal of the performance is to use a study of Chekhov's growth to show us how theatre allows people to grow themselves. This project revolves around the art of theatre and addresses its significance in our current era.

An Analysis of Green Buildings: Comparing Tsinghua University's Sino-Italian Ecological and Energy-Efficient Building and UGA's new Odum School of Ecology Building

Sheena Zhang
Dr. Laurie Fowler, Odum School of Ecology, University of Georgia

China has recently surpassed the United States as the highest emitter of carbon dioxide. In both countries, approximately 30% of total greenhouse gas emissions and nearly 40% of total energy consumption are due to the built environment (i.e. buildings and infrastructure). Because China's energy structure is coal-based, the rapid rate of urbanization and demand for new construction has resulted in significant environmental and public health effects. By improving energy efficiency in buildings, carbon emissions can be reduced by up to 22%. This study focuses on two green buildings–the Sino-Italian Ecological and Energy-efficient Building at Tsinghua University in Beijing and the Odum School of Ecology Living Building at the University of Georgia in Athens, GA. Green buildings in the public sector were selected for analysis because universities are at the forefront of the green building industry. Interviews with project managers, university administration, architects, and green building consultants were conducted, in addition to literature research to compare the two buildings and green building industries in China and the United States. Through comparison of the two buildings, insight will be gained into understanding how to overcome barriers to the further growth of the green building industry in these two countries. By addressing obstacles in the green building industry, green buildings can become the standard of building construction and have a reduced impact on climate change, the environment and public health.

Glare Disability, Photostress Recovery and Chromatic Contrast in Relation to Retinal Lutein and Zeaxanthin

Quincy Zhong
Dr. Billy Hammond, Department of Psychology, University of Georgia

Disability due to glare and recovery from photostress are particular problems for people with eye disease and for the elderly in general. Chromatic sensitivity is also affected by glare, due to color unsaturation by bright light, which can decrease the quality of images by obscuring borders. Previous studies have shown that dietary carotenoids, such as lutein and zeaxanthin, are linked to macular health. Recent data has also shown that preventing short wave light from hitting foveal cones results in improved glare disability, photostress recovery and contrast sensitivity. In this study we measured the macular pigment densities of 150 subjects, ages 21-40, using a standardized psychophysical technique. Glare disability, photostress recovery and contrast sensitivity were measured in Maxwellian view, where a real image of a light source is directly focused on the pupil, using a broadband xenon light source. Our results indicated that macular pigment density was significantly related to glare disability ($p<0.0015$), photostress recovery times ($p<0.01$) and contrast sensitivity ($p<0.00005$). These results confirm earlier reports of a strong relation between variation in retinal carotenoid concentrations and many aspects of visual function.

Index of Students and Faculty

G

H

I

J

K

L

M

THE UNIVERSITY OF GEORGIA
CENTER FOR UNDERGRADUATE RESEARCH OPPORTUNITIES

2012

CURO

Symposium

Program and Abstracts

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The University of Georgia
Athens, GA 30602
(706) 542-5871

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Table of Contents

CURO

April 2, 2012

Dear Students, Faculty, and Guests:

Welcome to the 12th annual CURO Symposium, UGA's celebration of undergraduate research across the disciplines. Many individuals—administrators, faculty members, staff, graduate students, and, of course, undergraduates—have collaborated to make the CURO Symposium the premier undergraduate academic event at UGA, and the 2012 CURO Symposium is the largest to date. The first CURO Symposium featured a handful of students presenting to each other around a single table. Today, nearly 200 undergraduate researchers will communicate their substantial accomplishments to their peers, mentors, and the public at large.

From its inception, the CURO Symposium has showcased research and scholarship in all disciplines. The 2012 Symposium continues that commitment, featuring presenters from 49 departments in 14 colleges/schools. Thus, today evidences UGA's broad and substantial support of research, and the invaluable commitment of UGA's administration and faculty to mentoring and providing exceptional learning opportunities for our undergraduates.

Thank you for your continued support of undergraduate research and CURO.

Sincerely,

Dr. David S. Williams, '79, '82
Associate Provost and Director

Acknowledgements

Special Assistance for 2012 CURO Symposium

Ms. Heather Carlson	Assistant to the Director, Honors Program
Ms. Whitney Ising	Student Worker, CURO
Mr. Alex Knoblock	Student Worker, CURO
Ms. Gwen Nuss	Administrative Associate, CURO
Ms. Dorothé Otemann	Coordinator of External Affairs, Honors Program
Ms. Chelsea Smith	Administrative Associate, External Affairs, Honors Program

Technology Equipment and Support

Center for Teaching & Learning
College of Agricultural & Environmental Sciences
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Franklin College of Arts & Sciences
Grady College of Journalism & Mass Communication
Honors Program
Terry College of Business

Faculty Reviewers for 2012 CURO Research Mentoring Awards

Dr. Brian Cummings	Pharmaceutical & Biomedical Sciences, College of Pharmacy (2009 Early Career Award)
Dr. Anna Karls	Microbiology, Franklin College of Arts & Sciences (2009 Early Career Award)
Dr. William Kisaalita	Biological and Agricultural Engineering, College of Agricultural & Environmental Science (2005 Master Level Award)
Dr. John Maerz	Vertebrate Ecology, Warnell School of Forestry & Natural Resources (2010 Early Career Award)
Dr. Walter Schmidt	Biochemistry & Molecular Biology, Franklin College of Arts & Sciences (2008 Early Career Award)

Faculty Reviewers for 2012 CURO Summer Research Fellowships

Dr. Carl Bergmann	Biochemistry & Molecular Biology
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Dr. Monica Gaughan	Department of Health Policy & Management
Dr. Patricia Hunt-Hurst	Department of Textiles, Merchandising, & Interiors
Dr. John C. Inscoe	Department of History
Dr. Fran Teague	Department of English

Faculty Reviewers for 2012 CURO Symposium Best Paper Awards

Prof. Mark Callahan	Lamar Dodd School of Art
Dr. Tim Hoover	Department of Microbiology
Dr. John C. Inscoe	Department of History
Dr. Russ Karls	Department of Infectious Diseases
Dr. Pamela Orpinas	Department of Health Promotion & Behavior
Dr. Andy Owsiak	Department of International Affairs
Dr. Fran Teague	Department of English

Acknowledgements

Graduate Student Reviewers for 2012 CURO Symposium Best Paper Awards

Ms. Mollie Barnes	Department of English
Ms. Lisa Bolding	Department of English
Mr. Sean Buskirk	Department of Infectious Diseases
Mr. Paul Carlsen	Department of Political Science
Ms. Teneema Kuriakose	Department of Infectious Diseases
Ms. Adrienne Madison	Department of Engineering
Ms. Cary McGinnis	Department of Pharmaceutical & Biomedical Science
Ms. Crystal Phillips	Department of Microbiology
Mr. Alexander Vaughn	Department of Chemistry

Oral Session Conveners for 2012 CURO Symposium

Ms. Lisa Bolding	Department of English
Ms. Joy Bracewell	Honors Program
Mr. Sean Buskirk	Department of Infectious Diseases
Ms. Rebecca Cheney	Honors Program
Mr. Douglas Eudy	Institute of Plant Breeding, Genetics & Genomics
Ms. Teneema Kuriakose	Department of Infectious Diseases
Ms. Adrienne Madison	Department of Biological Engineering
Ms. Cary McGinnis	Department of Pharmaceutical & Biomedical Sciences
Ms. Crystal Phillips	Department of Microbiology
Ms. Amanda Pretti	Honors Program
Dr. Martin Rogers	Honors Program
Mr. Alexander Vaughn	Department of Chemistry

Schedule

Monday, April 2, 2012

Oral Session I **9:05 a.m.**
Classic Center, Athena Breakout Rooms A, B, C, D, G, H, I, J

Oral Session II **10:10 a.m.**
Classic Center, Athena Breakout Rooms A, B, C, D, G, H, I, J

Oral Session III **11:15 p.m.**
Classic Center, Athena Breakout Rooms A, B, C, D, G, H, I

Oral Session IV **12:20 p.m.**
Classic Center, Athena Breakout Rooms A, B, C, D, G, H, I, J

Oral Session V **1:25 p.m.**
Classic Center, Athena Breakout Rooms A, B, C, D, G, H, I

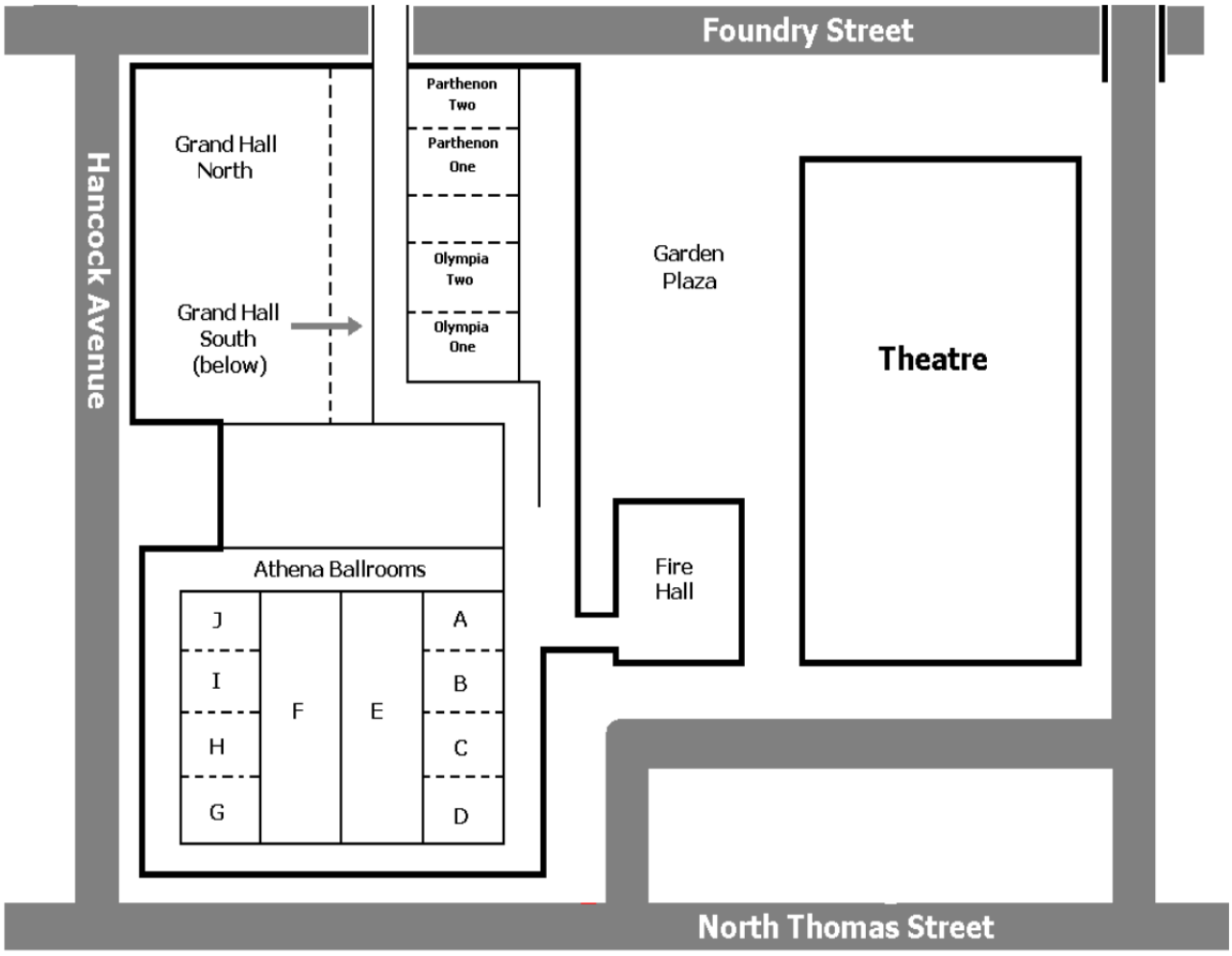
Oral Session VI **2:30 p.m.**
Classic Center, Athena Breakout Rooms A, B, C, D, G, H, I

Awards and Keynote Session **4:00 p.m.**
Classic Center, Athena Ballroom E

Poster Session and Reception **5:00 p.m.**
Classic Center, Grand Hall South (downstairs-use escalator in lobby)

The CURO 2012 Symposium will close at 6:00 p.m.

Classic Center Facility Layout



CURO Research Mentoring Awards

The Office of the Senior Vice President for Academic Affairs and Provost and the Honors Program established the CURO Research Mentoring Award in 2001.

These awards recognize outstanding faculty who consistently make a concerted effort to engage undergraduate researchers and enhance the learning experience of undergraduates at The University of Georgia, especially through CURO. Award recipients have demonstrated superior research opportunities and mentoring programs for their undergraduate students, including outstanding teaching, supervision of undergraduate research courses and theses pursued through CURO, and collaboration on publications and presentations at professional conferences.

2012

Master Level Faculty Award
Dr. Lawrence Shimkets, Department of Microbiology
Early Career Faculty Award
Dr. Michael Yabsley, Warnell School Forestry & Natural Resources

2011

Master Level Faculty Award
Dr. Eric Stabb, Department of Microbiology
Early Career Faculty Award
Dr. John Drake, Odum School of Ecology
Program Award
Savannah River Ecology Laboratory
Dr. Kenneth McLeod, Interim Director

2010

Early Career Faculty Award
Dr. John C. Maerz, Warnell School of Forestry & Natural Resources

2009

Early Career Faculty Award
Dr. Brian S. Cummings, Department of Pharmaceutical & Biomedical Sciences
Dr. Anna C. Karls, Department of Microbiology
Dr. Dawn T. Robinson, Department of Sociology

2008

Master Level Faculty Award
Dr. John J. Maurer, College of Veterinary Medicine
Early Career Faculty Award
Dr. Walter K. Schmidt, Department of Biochemistry & Molecular Biology
Program Award
Biomedical and Health Sciences Institute
Dr. Harry S. Dailey, Director

2007

Master Level Faculty Award
Dr. Timothy Hoover, Department of Microbiology

CURO Research Mentoring Awards

Early Career Faculty Award
Dr. Steven Stice, Department of Animal & Dairy Science

2006

Master Level Faculty Award
Dr. Patricia Hunt-Hurst, Department of Textiles, Merchandising & Interiors
Early Career Faculty Award
Dr. Rodney Mauricio, Department of Genetics
Graduate Student Award
Christopher Anderson, PhD candidate in Ecology
Graduate Student Recognition
Dawn Holligan, PhD candidate in Plant Biology

2005

Faculty Award
Dr. Gary Barrett, Odum School of Ecology
Dr. Sidney Kushner, Department of Genetics
Department Award
Department of Cellular Biology

2004

Faculty Award
Dr. William S. Kisaalita, Department of Biological & Agricultural Engineering

2003

Faculty Award
Dr. Jody Clay-Warner, Department of Sociology
Department Award
Department of Microbiology
Dr. Duncan Krause, Department Head
Dr. Timothy Hoover, Undergraduate Coordinator
Program Award
The Pratt Laboratory of Plant Genomics and Bioinformatics
Dr. Lee H. Pratt, Department of Plant Biology
Dr. Marie-Michèle Cordonnier-Pratt, Department of Plat Biology

2002

Faculty Award
Professor William D. Paul, Jr., Lamar Dodd School of Art
Dr. Katherine Kipp, Department of Psychology
Faculty Recognition
Dr. Susan Sanchez, College of Veterinary Medicine
Department Award
Department of Biochemistry & Molecular Biology
Dr. J. David Puett, Department Head
Program Award
"Physics Beyond the Boundaries": National Science Foundation, REU Program
Dr. Loris Magnani, Principal Investigator, Department of Physics & Astronomy

Dr. Heinz-Bernd Schuttler, Department Head, Department of Physics & Astronomy
Dr. Jonathan Arnold, Department of Genetics
Dr. Susmita Datta, Georgia State University
Dr. David Logan, Clark Atlanta University
Dr. William Steffans, Clark Atlanta University

2001

Faculty Award

Dr. Marcus Fechheimer, Department of Cellular Biology

Faculty Recognition

Dr. David MacIntosh, Department of Environmental Health Sciences
Dr. Dean Rojek, Department of Sociology

Department Award

Department of Genetics
Dr. John MacDonald, Department Head

Program Award

Savannah River Ecology Laboratory
Dr. Paul Bertsch, Director

CURO Symposium Best Paper Awards

Since 2001, CURO Symposium Best Paper Awards have recognized excellence in papers developed from work being presented at that year's Symposium.

Applicants may submit in one or more of the following categories: arts, humanities, social sciences, civic responsibility focus, international focus, biological sciences, and physical sciences

Each recipient is recognized at the Symposium's Award and Keynote Session, and each award carries $100 in financial support, generously provided by the UGA Alumni Association. Winners from the 2012 CURO Symposium are listed below.

Arts:

Brendan Boyle	The New Western: Classical Genre Cinema in the 21st Century

Biological Sciences:

Tommaso Tosini	Characterization of Cone Degeneration in the Opn1.GFP Transgenic Mouse Retina

Civic Responsibility Focus:

Emily Fountain	Segregation in a Modern Age: Systematic Patterns and Consequences

Humanities:

Joshua Trey Barnett	We Are All Royalty: Narrative Comparison of a Drag Queen and King
Hope Rogers	No Triumph without Loss: Problems of Interracial Collaboration in Tolkien's Works

International Focus:

Logan Krusac	Individual Environmental Awareness and Urban Water Conservation in Kunming, China

Physical Sciences:

Christopher Sudduth	Measuring Chronic Ankle Instability in a Recreationally Active Population

Social Sciences:

Matthew Taylor	Teacher Evaluation Methods in Georgia Public Schools

Program

Monday, April 2, 2012

Concurrent Oral Sessions
Classic Center, Athena Breakout Rooms A, B, C, D, G, H, I, J

9:05 – 9:55 a.m. Session I

Room A	**Caitlin McManemon**	Discrepancy Between Client Expectations and Doctor Reports of the Success in Treatment of Veterinary Patients
	Mark Zapata	Reversal of Acepromazine Sedation by Doxapram in Dogs
	Amita Nawathe	Gestational Diabetes Education Program
Room B	**Mark Rolfsen**	The Implementation of Effective Smoking Cessation Interventions for Drug and Alcohol Addicts in Substance Abuse Treatments
	Christopher Sudduth	Measuring Chronic Ankle Instability in a Recreationally Active Population
	Philip Oldham	Truth in Labeling: Nutritional Value Under NLEA
Room C	**Elena James**	Development of a Genetic Screen for Vitamin B12 Uptake Mutants in Mycobacteria
	Alexandra Dodd	The Role of Galacturonosyltransferase in the Acetylation and Methylation of Homogalacturonan During Pectin Biosynthesis
	Abby Weinberger	Cognitive Measures, Antisaccade Performance and Obesity in Children
Room D	**Natalya Haas**	A Piece of the Puzzle: Why People Wear Peace Signs Today
	Ransom Jackson	The Belle and the Behemoth: *Uncle Tom's Cabin* and the Southern White Woman
	Nicole Armbrust	Kathoey: Dress, the Only Opportunity for Success
Room G	**Catherine Debban**	Do Mushroom-Feeding *Drosophila* Self-Medicate with Alpha-Amanitin in Response to Nematode Parasitism?

	William Costanzo	Algae Biofuel Development: Growth Efficiency
	Matthew Smith	Determination of Virulence Factors Associated with *Histomonas meleagridis*' Cause of Blackhead's Disease in Gallinaceous Birds
Room H	**Alexis Garcia**	The Militarization of U.S. Intelligence?
	Sophie Giberga, **John Henry Thompson**	Drilling for the Future: Domestic Oil Production and Meeting America's Energy Needs
Room I	**Julian Rios**	DNA Hybridization in the Presence of Single-Walled Carbon Nanotube/ssDNA Complexes
	John Liu	The Relationship Between Macular Pigment and Neural Compensation
	Andrew Suddreth	Proteome Studies of the Interation Between *Botrytis cinerea* and Tomato Fruit
Room J	**Star Ye**	The Effect of Hypoxia on Transketolase in Breast Cancer Cells
	Patrick Wheat	U.S. Policy Alternatives to a Military Takeover in Egypt
	Dhillon Zaver	Photoimmunotherapeutic Nanoparticles for Combination Therapy of Breast Cancer

10:10 – 11:00 a.m. Session II
Classic Center, Athena Breakout Rooms A, B, C, D, G, H, I, J

Room A	**Brittany Feldhaeusser**	Influence of Different Cell Storage/Culture Conditions on Spontaneous Proliferation and Tyrosine Kinase Receptor Inhibition in Two Feline Injection-Site Sarcoma Cell Lines, In Vitro
	Lauren Sullivan	Pathogenesis of Chicken Astrovirus as Studied by In-Situ Hybridization
Room B	**Justin Smith**	Characterization of a Putative Endonuclease-RNA Complex Involved in CRISPR-Mediated Viral Defense
	Jenny Brickman	Correlations Between Ankle Laxity and Dynamic Postural Stability

	Nathan Usselman	Optimization of Surface-Initiated Kumada Catalyst Transfer Polycondensation
Room C	**David Parker**	The Effects of Volume Removal on Values of Factional Anisotropy
	Stephen Robertson, Aaron Murray	An Examination of Communication and Employee Engagement
Room D	**Katherine Black**	Differences in Functional Movement Screen Scores Between Genders in NCAA Division I Athletes
	Suzanne Meller	Emotion Regulation and Childhood Depression: An Examination of Moderators
	Yiran (Emily) Peng	Reducing Costs and Maintaining Quality: Alternatives to Fee-for-Service in Federal Health Insurance Plans
Room G	**Rachel Bonds**	Outward Migration and the Kenyan Economy: Transforming the Brain Drain to a Brain Gain
	Dana Schroeder	Progress Toward Sustainability Goals at UGA's Costa Rica Campus in San Luis de Monteverde, Costa Rica
Room H	**Melissa McDaniel**	War, Peace, and Seduction: An Analysis of Tolstoy's Hélène Kuragin as a Symbol of Female Sexuality
	Audrey Glasgow	The Uses and Effects of Music in the Conflict in Northern Ireland
	Brittany McGrue	Public Art in Athens-Clarke County
Room I	**Malavika Rajeev**	Predictors of Tick Burden and Engorgement in Grant's Gazelle
	Jenna Grygier	Management of Marine Debris in the U.S.: A Survey of Options and Database for Decision-Makers
Room J	**William French, Ryan McLynn**	The Effect of Protein Kinase Inhibitors on the Growth of *Plasmodium falciparum*
	Cameron Zahedi	Addressing Students' Math Deficiencies in Introductory Physics with Online Scaffolded Problems
	Matthew Taylor	Teacher Evaluation Methods in Georgia Public Schools

Program

11:15 – 12:05 p.m. Session III
Classic Center, Athena Breakout Rooms A, B, C, D, G, H, I

Room A	**Daniel Smith**	Inferno
	Lea Rackley	Finding the Child in Children's Literature
	Meghan Russell	Architecture and Dress
Room B	**Elizabeth Crowley**	Racial Inclusivity and Exclusivity in HBO's *True Blood*: A Viewer-Response Critique via Hans Robert Jauss's "Horizon of Expectations"
	Lauren Anderson	The Legacy of Truth: Analyzing the TRC's Impact on South Africa's Millennial Generation
	Anisha Hegde	Increasing Breastfeeding Rates in Athens-Clarke County
Room C	**Marianne Ligon**	Characterization of the Tneap Complex in the CRISPR-Cas Viral Defense System of Prokaryotes
	Joshua Parker	Investigating Post-Translational Modification and Activity of Zebrafish Glycosidases
	Stephen Bocarro	The Characterization of Long Flagella 4 Protein in *Tetrahymena*
Room D	**Waring Trible III**	Manipulating Tropical Fire Ant Populations to Decrease the Coffee Berry Borer
	Katrina Egan	Effect of Anesthetic Variables on Recovery Time in Dogs
	Chelsea Renier	Does Eggshell Pigmentation Reflect Female Condition in Broiler Breeder Hens?
Room G	**Joshua Trey Barnett**	We Are All Royalty: Narrative Comparison of a Drag Queen and King
	Tyler Bugg	'All Truth is Bitter': Legacies of a Post-Apartheid, Post-TRC South Africa
	Emily Fountain	Segregation in a Modern Age: Systematic Patterns and Consequences

Room H	**JoyEllen Freeman**	A Portrayal of Power: Black Nationalism in the Documentary *Now Is the Time*
	Anna Beth Havenar	An Affect Control Theory Analysis of Islam and Christianity
	Connor Land	Information as Narrative Poison or Poultice in Ergodic Literature
Room I	**Benjamin Harris**	Race Relations in Brazil Between 1890 and 1920
	Samuel Kinsman	Private Equity in Brazil

12:20 – 1:10 p.m. Session IV
Classic Center, Athena Breakout Rooms A, B, C, D, G, H, I, J

Room A	**Tyler Bugg**	Giving Voice to Silence: Theatre and Community in *He Said, She Said, Zhe Said: Gender Stories*
	Emily Jessup	Noah Webster's *American Spelling Book* as a Product of Colonial American Culture and Economics
	Brendan Boyle	The New Western: Classical Genre Cinema in the 21st Century
Room B	**Abid Fazal**	Production of Saccharification Enzymes by Recombinant Fungus Grown on Pectin-Rich Biomass Materials
	Charles Blair III	A Shot in the Dark: How Information Affects Consumer Light Bulb Purchases
	Heather Hatzenbuhler	Residential Electricity Consumption and Affordability of Efficiency and Clean Energy Upgrades
Room C	**Peter Sisk**	Proteomics Analysis of Canine Prostate Carcinoma Tissue: A Potential Animal Model of a Human Disease
	Sam Hempel	Developing Kinetic Genotype-Phenotype Correlations for Missense Point Mutations in Human Protein O-Linked Mannose β-1,2 N-Acetylglucosaminyltransferase (POMGnT1)

	Lindsey Megow	Effects of Helminth Infection on Local and Systemic Immunity
Room D	**Tanya Dieumegarde**	The Responsiveness of Mothers in Organic and Inorganic Nutrition in Ghanaian Children and the Social and Economic Implications
	Todd Pierson	Narcotics-Trafficking, Cloudforests, and a Killer Fungus: Amphibian Conservation in Central America
	Garrett Melick	Histological and Protein Expression Changes in Mouse Models of Early Dystroglycanopathy
Room G	**Anita Bhagavathula**	Vitamin D Deficiency in the African American Population
	Smitha Ganeshan	Access to Primary Care Services in Athens
	Bryn Murphy	Prospect Theory and Common Action Problems: Loss Aversion in International Riparian Treaty Compliance
Room H	**Erin Giglio**	The Role of Sensory Systems in *Drosophila* Courtship Across Populations
	Allyson Byrd	Comparative Genomics of Ribosomal RNAs in Malaria Parasites
	Daniel Guidot	Description and Measurement of Response to Osmotic Stress in *Toxoplasma gondii*
Room I	**Hope Rogers**	No Triumph Without Loss: Problems of Interracial Collaboration in Tolkien's Works
	Stephanie Talmadge	Social Media's Effect on the Arab Spring Revolutions
	Sarah Mitchell	Effect of Sugar on Brain Peptides
Room J	**Stephanie Wilding**	Expression of Secretory Phospholipase A2 in Prostate Cancer Cells Lines
	Lauren Titus	The Effect of Lipoic Acid on Inflammatory Cytokines and Messenger RNA Levels in Microglial Cells

	Michael Webber	*Methionine Sulfoxide Reductase* Gene Regulation in *Vibrio fischeri*

1:25 – 2:15 p.m. Session V
Classic Center, Athena Breakout Rooms A, B, C, D, G, H, I

Room A	**Debashis Ghose, Sr.**	Stability Analysis of the Inhibitor Resistant Phenotype of AJP50 in Biomass Fermentations
	Philip Grayeski	Genetic Manipulation of *Caldicellulosiruptor bescii* for Biomass Utilization
	Heather Hatzenbuhler	Legal Approaches to Addressing Water Pollution Risks Related to "Fracking" in the Marcellus Shale Region
Room B	**Brooke Bauer**	Organizational Commitment in the Workplace
	Anna Wilson	A Sociolinguistic Perspective on Roswell, GA
	Suze Valmé, Morgan Capps	An Investigation of the Role of Work Status in Relation to Company Growth
Room C	**Melanie Fratto**	Infection Modifies the Effects of Stress on Immune Function in Birds
	Daniel Pique	Regulation of the Cell Cycle in the African *Trypanosome* by Small Molecule Inhibitors and Serum Deprivation
	Jennifer Hegarty, Laura Hegarty	Recycling and End-Use Industries in Georgia
Room D	**Ashley Blackburn**	High Resolution Behavioral Economic Analysis of the Price Sensitivity of Smoking Cessation Motivation
	John Rodriguez	Combatting Obesity by Eliminating Food Deserts in Athens-Clarke County
	Dev Iyer	Prisons for Profit: A New Approach to the Private Prison Model in the State of Georgia
Room G	**Terese Gagnon**	Landscapes of the Interior: Ethnobotany and Senses of Place Among Karen Refugees

	Khai Nguyen	Post-Katrina Recovery Processes in the Vietnamese-American Community
	Cody Knapp	International Boundary Settlement and Domestic Conflict
Room H	**Kieran Maynard**	Lost Chapters in the *Wind-Up Bird Chronicle*: A Translation and Commentary
	Sarah Potter	Aporetic Structure in Marcel Proust's *In Search of Lost Time*
	Elina Kumykova	Exploring Medical Practice Through Chekhov's Literature
Room I	**Connor Sweetnam**	The Interaction of Tau Proteins and Hirano Bodies
	Farres Obeidin	Modeling Subtelomeric Growth and the Adaptive Telomere Failure Hypothesis
	Casey Love	Phospholipase Expression in Cocaine-Addicted Rats

2:30 – 3:20 p.m. Session VI
Classic Center, Athena Breakout Rooms A, B, C, D, G, H, I

Room A	**Katherine Helmick**	Dietary Resource Partitioning of the Southern Flying Squirrel (*Glaucomys volans*)
	Brigid Burns	Anesthetic Complications in Dogs Undergoing Surgery for Liver Disease
	Kelsey Campolong	The Role of Coagulation in Cerebral Malaria in the Mouse Model
Room B	**Theresa Stratmann**	The Science of Monitoring Rare Species: Developing Methods to Locate and Survey for the Endangered Bog Turtle
	Ruth Davis	An Alternative Perspective?: Dora Mayer's Contributions to the Peruvian *Indigenismo* Movement
	Kayci Schoon	The Resistance Complex in Lyon: Politics, Memory, History

Program

Room C	**Hope Rogers**	The Skeleton in the Closet: Deadly Duplications in Mary Shelley's *Frankenstein*
	Christopher Bailey II	Computational Modeling of Emergent Dynamics in Language
Room D	**Tuiumkan Nishanova**	Assembly and Subspeciation of Haptoglobin-Related Protein Containing High-Density Lipoproteins
	Joseph Hill, Brittany Feldhaeusser	Effects of Platelet-Derived Growth Factor Receptor Inhibition on Feline Injection-Site Sarcoma Radiosensitivity
	Nakul Talathi	Characterization of *cis/trans* Phosphorylation Modes in a Eukaryotic Protein Kinase
Room G	**Eilidh Geddes, Avery Wiens**	Teacher Attrition: Possible Policy Solutions
	William Smith	Compelling State Interest: A Study of the Unequal Application of Strict Judicial Scrutiny
	Logan Krusac	Individual Environmental Awareness and Urban Water Conservation in Kunming, China
Room H	**Luben Raytchev**	Haemogregarines of Freshwater Turtle Species: Does Basking Behavior Influence Parasitemia Levels?
	Osama Hashmi	Analysis of the Legal Needs of Primary Care Physicians
	Allison Doyle	Increasing Access to Primary Care for Low-Income Rural Georgians
Room I	**Paul Havenstein**	Rastafari: Continuity, Discontinuity, and Present Identity
	Aaron Murray	Measuring Transformational Leadership in the NFL

4:00 p.m. Awards and Keynote Session
Classic Center, Athena Ballroom E

Welcome and Introductions	Dr. David S. Williams, Associate Provost and Director, Honors Program

Program

Remarks	Professor Jere W. Morehead, Senior Vice President for Academic Affairs and Provost
Introduction to Awards	Dr. William Kisaalita, Associate Director, CURO
CURO Research Mentoring Awards	Dr. David C. Lee, Vice President for Research
2012 Symposium Best Paper Awards	Dr. Laura Jolly, Vice President for Instruction Ms. Deborah Dietzler, Executive Director, Alumni Association
UGA Libraries' Research Awards	Ms. Caroline Barratt, Director, Miller Learning Center Library Commons
Introduction of Keynote Speaker	Ms. Dana Higgins, Foundation Fellow '12, International Policy
Keynote Address	Dr. Charles Bullock, Richard B. Russell Professor of Political Science "A Prospective Look at the 2012 Elections"
Closing Comments	Dr. David S. Williams, Associate Provost and Director, Honors Program

5:00 p.m. Poster Presentations
Classic Center, Grand Hall South (downstairs - use the escalator in the lobby)

Poster #1	**Aditya Aphale**	Test-Retest Reliability and Data Analysis for the NeuroCom Postural Stability Test
Poster #2	**Charlotte Ball**	Assessment of Fukutin's Biological Function by Identification of Associated Proteins
Poster #3	**Stephen Bocarro**	The Characterization of Long Flagella 4 Protein in *Tetrahymena*
Poster #4	**Kathryn Briggs**	Insertion of Hemagglutinin Gene from H5N1 into Parainfluenza Virus Type 5 (PIV5) Offers Immunity in Mice Against H5N1 Challenge
Poster #5	**Melissa Brown**	Black Stereotypes in Reality Television and the Reinforcement of Prejudiced Attitudes
Poster #6	**Allyson Byrd**	Comparative Genomics of Ribosomal RNAs in Malaria Parasites

Poster #7	**Neal Canlas, Michael Theobald**	Arterial Flow Pattern in People with Peripheral Arterial Disease
Poster #8	**Vinay Choksi**	Mating Regulates Germ Line Stem Cell Division Frequency in Testes of *Drosophila melanogaster*
Poster #9	**Dervin Cunningham, Jr.**	Proteomic Analysis of the Tomato/*Botrytis cinerea* Interaction
Poster #10	**Kasey Darley**	A Therapeutic Nanoparticle Platform for Targeting Mitochondrial Superoxide
Poster #11	**Tanya Dieumegarde**	The Responsiveness of Mothers in Organic and Inorganic Nutrition in Ghanaian Children and the Social and Economic Implications
Poster #12	**Alexandra Dodd**	The Role of Galacturonosyltransferase in the Acetylation and Methylation of Homogalacturonan During Pectin Biosynthesis
Poster #13	**Sarah-Bianca Dolisca**	The Sweet Connection: O-linked β-N-Acetylglucosamine Transferase and Cancer Stem Cells
Poster #14	**Abid Fazal**	Production of Saccharification Enzymes by Recombinant Fungus Grown on Pectin-Rich Biomass Materials
Poster #15	**Brittany Feldhaeusser**	Influence of Different Cell Storage/Culture Conditions on Spontaneous Proliferation and Tyrosine Kinase Receptor Inhibition in Two Feline Injection-Site Sarcoma Cells Lines, In Vitro
Poster #16	**Hope Foskey**	Identification of GABA-Responsive Neurons in the Zebrafish Brain
Poster #17	**William French, Ryan McLynn**	The Effect of Protein Kinase Inhibitors on the Growth of *Plasmodium falciparum*
Poster #18	**Nisha George**	The Role of Cysteine Residues in the Function of Ras Converting Enzyme
Poster #19	**Mina Ghobrial**	Testing Algorithms to Predict Onset of Cerebral Malaria in Murine Model
Poster #20	**Philip Grayeski**	Genetic Manipulation of *Caldicellulosiruptor bescii* for Biomass Utilization

Poster #21	**Daniel Guidot**	Description and Measurement of Response to Osmotic Stress in *Toxoplasma gondii*
Poster #22	**Tyler Haeffs**	Limb Morphology and Sequence Divergence in the *fgf* Genes of *Anolis* Lizards
Poster #23	**Hannah Hanley**	Digital Analysis of Feline Bone Marrow Fat Content
Poster #24	**Alexander Hansen**	Relationship Between Left Uncinate Fasciculus White Matter Integrity and Verbal Memory
Poster #25	**Jennifer Hegarty, Laura Hegarty**	Recycling and End-Use Industries in Georgia
Poster #26	**Alexander Herzog**	Protein-Glycosaminoglycan Interaction Studies Using Surface Plasmon Resonance (SPR)
Poster #27	**Rachel Johnson**	Examining Genetic Diversity in Peruvian Samples of *Plasmodium falciparum*
Poster #28	**Mathew Joseph**	Inflammatory Cell Markers' Gene Expression in Mouse Model of Placental Malaria
Poster #29	**Michael Klodnicki**	A New Approach to Histomoniasis: Data Mining and Targeted Drug Sensitivity
Poster #30	**Kelsey Kuperman, Suzanne Meller**	The Moderating Role of Romantic Relationship Satisfaction on the Relation Between Parenting Stress and Maternal Hostility
Poster #31	**SaiSudeepti Kuppa**	Development of a Vector to Delete the β-Lactamase Gene from Mycobacteria
Poster #32	**Monica LaGatta**	Construction of a vapB Deletion Mutation in a Swine Isolate of *Rhodococcus equi*
Poster #33	**Kellie Laity**	Development of Nut-Cracking Skills in Wild Bearded Capuchin Monkeys (*Sapajus libidinosus*)
Poster #34	**Christopher Lee**	Immortalization of Primary Swine Respiratory Epithelial Cells
Poster #35	**Michelle Lee**	The Contribution of Environmental Contamination with *Salmonella* to Human Illnesses in Georgia

Poster #36	**Hillary Liken**	Stimulation Current Does Not Influence NIRS Measured Metabolic Rate
Poster #37	**John Liu**	The Relationship Between Macular Pigment and Neural Compensation
Poster #38	**Katie Manrodt**	The Molecular Dynamics of Atomic Sticking Coefficients
Poster #39	**Lindsey Megow**	Effects of Helminth Infection on Local and Systemic Immunity
Poster #40	**Garrett Melick**	Histological and Protein Expression Changes in Mouse Models of Early Dystroglycanopathy
Poster #41	**Suzanne Meller, Sophie Arkin, Isabel Cohen**	Cumulative Risk and Child Psychopathology: Understanding the Role of the Parenting Relationship
Poster #42	**Hannah Muetzelfeld**, **Grace Cha**	Insecure Attachment, Low Self-Esteem, and Low Parental Warmth as Predictors of Substance Abuse
Poster #43	**Melesse Nune**	Protein Purification, Crystallization, and Functional Annotations of Five Essential LysR-type Transcriptional Regulators in *Acinetobacter baylyi* ADP1
Poster #44	**Philip Oldham**	Truth in Labeling: Nutritional Value Under NLEA
Poster #45	**Andrea Orton, James Ford, Kristen Whipple**	Development of Disability Awareness Assessment Scale
Poster #46	**Elliot Outland**	Finite-Difference Time-Domain Investigations of Metamaterials
Poster #47	**Akshita Parikh**	Affinity and Specificity Characterization of Fbs1 via Surface Plasmon Resonance and Glycan Array Screening
Poster #48	**David Parker**	The Effects of Volume Removal on Values of Factional Anisotropy
Poster #49	**Anisha Patel**	Cognitive Differences Between Objective and Subjective Memory Complaints

Poster #50	**Nisarg Patel, Christopher Lee**	Stable Cell Line Engineered with shRNA Against TMPRESS2 Protease to Reduce the Infection of Influenza Virus
Poster #51	**Todd Pierson**	Arabian Nights: Preliminary Survey of Herpetofauna and the Phylogeography of *Bufo dhufarensis* (*Bufonidae*) in Oman and the United Arab Emirates
Poster #52	**Daniel Pique**	Regulation of the Cell Cycle in the African Trypanosome by Small Molecule Inhibitors and Serum Deprivation
Poster #53	**Michael Rausher, Isabel Cohen**	Relations of Substance Use to Constructive Communication and Sexual Violence in Young Adults' Romantic Relationships
Poster #54	**Daniel Sharbel**	Assessing Rce1-Protease Inhibition in a Cell-Based Fluorescence Ras Localization Assay
Poster #55	**Andrea Sikora**	Intravenous Minocycline and Its Effect on Peripheral Interleukin-6 After Ischemic Stroke
Poster #56	**Lauren Sullivan**	Pathogenesis of Chicken Astrovirus as Studied by In-Situ Hybridization
Poster #57	**Nakul Talathi**	Characterization of *cis/trans* Phosphorylation Modes in a Eukaryotic Protein Kinase
Poster #58	**Korry Tauber**	Examining the Function of O-GlcNAc in Regulating Intracellular Signaling Pathways During *Drosophila* Development
Poster #59	**Lauren Titus**	The Effect of Lipoic Acid on Inflammatory Cytokines and Messenger RNA Levels in Microglial Cells
Poster #60	**Emma Torpy**	Global Web Advertising: How Different Countries Regulate Digital Advertisement
Poster #61	**Tommaso Tosini**	Characterization of Cone Degeneration in the Opn1.GFP Transgenic Mouse Retina
Poster #62	**Waring Trible III**	Manipulating Tropical Fire Ant Populations to Decrease the Coffee Berry Borer

Poster #63	**Kishore Vedala**	Analyzing the Kinetic and Thermodynamic Properties of O-Man Initiated Glycan Binding Alpha-Dystroglycan and Laminin-2
Poster #64	**Stephanie Wilding**	Expression of Secretory Phospholipase A2 in Prostate Cancer Cells Lines
Poster #65	**Star Ye**	The Effect of Hypoxia on Transketolase in Breast Cancer Cells

Abstracts

The Legacy of Truth: Analyzing the TRC's Impact on South Africa's Millennial Generation

Lauren Anderson, CURO Summer Fellow
Dr. Amy Ross, Geography, Franklin College of Arts & Sciences

Following years of racial violence and political negotiations, post-apartheid South Africa established the Truth and Reconciliation Commission (TRC) to investigate past human rights violations and develop a culture of peace. From 1996 to 2001, the TRC accepted over 21,000 victim testimonies and incorporated victim and amnesty hearings in an effort to collect a full and accurate historical record. However, since the release of the TRC's Final Report, few studies have sought to examine the long-term implications of the TRC's work, especially among young people who were not involved in the commission process. For this project, I conducted eleven semi-structured interviews with students at the University of Stellenbosch in Stellenbosch, South Africa. Utilizing questioning that gauged the participants' understanding of the TRC and contemporary racial and political realities, I implemented a qualitative analysis of the data, paying particular attention to commonalities in the responses. In general, the participants relayed favorable opinions of the TRC as an institution and indicated positive attitudes of present racial tolerance and social integration. Nevertheless, there is little evidence that the TRC has contributed to these progressive relations, suggesting that the TRC has failed to directly influence lasting reconciliation. While these results question the success of the TRC's efforts, I attribute this conclusion to the TRC's methodological practices as opposed to the truth commission itself. By illuminating the structural weaknesses of the TRC, this study ultimately seeks to provide insight for other post-conflict societies, as well highlight the limitations of truth in correcting socio-economic inequities.

Test-Retest Reliability and Data Analysis for the NeuroCom Postural Stability Test

Aditya Aphale
Dr. Michael Ferrara, Kinesiology, College of Education

Sport-related concussion accounts for about 5% of the injuries in intercollegiate football. A concussion occurs when a blow to the head affects neurological function. A multifaceted approach to concussion management includes self-reporting symptoms, neuropsychological testing, and balance testing. The NeuroCom Smart Master Balance System is an instrument used to assess postural stability following a concussion. The assessment tests responsiveness of the visual, vestibular, and somatosensory systems. In order to determine whether the NeuroCom can be used as a viable tool in concussion assessment, the reliability of the instrument must be assessed. The purpose of this project was to assess the test-retest reliability using clinically relevant time periods (Baseline, Day 45, and Day 50) which have been previously used to establish the reliability of neuropsychological testing. The NeuroCom consists of a force plate and a surround that sways in response to a person's movement. There are six different conditions administered that assess the various physiological systems involved with balance. Participants in the study were divided into two groups. The first group (Group A) had the test's conditions administered in a fixed order while the second group (Group B) had the conditions administered in a random order. Mean stability values and intraclass correlation coefficients (ICC) were computed. Group B had generally higher ICC values than Group A, with ICCs in the 0.7-0.8 range. While these ICC values are acceptable, the addition of self-report symptoms and neurocognitive test to the NeuroCom assessment would strengthen diagnosis and return-to-play decisions following sport-related concussion.

Abstracts

Kathoey: Dress, the Only Opportunity for Success

Nicole Armbrust
Dr. Katalin Medvedev, Textile, Merchandising & Interiors, College of Family & Consumer Sciences

In present day Thailand, there are over 100,000 transsexual males, termed Ladyboys or Kathoey, to whom dress and beauty play significant roles in displaying their true identities. Kathoey believe themselves to be women trapped inside male bodies and consequently dress and exude female personas (Forbes, 2002). Although Thailand is said to be accepting of their transgenders, Ladyboys are still denied political and legal rights to their womanhood in addition to being discriminated against and stereotyped frequently. By studying Thai religion and culture and analyzing journals and media on Kathoey livelihood, I have come to the conclusion that dress, appearances, and beauty are the most essential aspects of Ladyboys' lives and acceptance into Thai society. Throughout every stage in a Ladyboy's life, dress plays a vital role in the realization of their true nature and in changing them into what they want to be. The pinnacle of success for these Ladyboys is to become completely convincing women in every way, which is extremely difficult and only accomplished through dress practices. After studying the Kathoey of Thailand, it is evident that respect and acceptance is only attained if they are able to project perfect feminine beauty. Without dress practices, the discrimination and ostracism of transgenders would be significantly worse. Through this study, it is clear that members in any society who are deemed "different" use dress as a means of acceptance. I have ultimately found that dress and appearance play integral roles in societal approval, regardless of what culture one identifies with.

Computational Modeling of Emergent Dynamics in Language

Christopher Bailey II, CURO Summer Fellow
Dr. Bill Kretzschmar, English, Franklin College of Arts & Sciences

Computer simulation is the only way to study the adaptivity of language over time. There is no detailed diachronic source of language data with which to study the changes of language actually in use, leaving historical linguists to draw conclusions from inadequate remains. Consequently, this study uses a hand-crafted piece of software to unpack the mechanisms that contribute to the dynamic, emergent order found in language. The program's primary function is to run simulations according to user-specified, probabilistic rules, which take into account geographic and social factors (e.g., proximity, gender, race, age) sampled from actual linguistic survey data. My research consists primarily of exploring rule combinations in search of those rule sets that produce frequency distributions like those we know to exist, as found in the Linguistic Atlas Project. The simulation achieves success if such a rule set is found (i.e., one showing evolving, non-linear distributions of linguistic variants among the simulated speakers). There are two reasons this research is significant. First, it breaks new ground – no computer simulation of language has ever been validated against a data set as large and thorough as that contained in the Linguistic Atlas Project. Second, this simulation has the potential to provide insight into fundamental questions about language variation like "How important are social factors in influencing the way people speak?" and "What facilitates the spread of linguistic items within communities of different scales?"

Abstracts

Assessment of Fukutin's Biological Function by Identification of Associated Proteins

Charlotte Ball
Dr. Aaron Beedle, Pharmaceutical & Biomedical Sciences, College of Pharmacy

Mutations in fukutin can cause congenital muscular dystrophy (CMD); however, the exact function of fukutin is still undetermined. The purpose of our research is to gather information about fukutin's biological role. Fukutin is known to be involved in the glycosylation of α-dystroglycan (αDG) because αDG is hypoglycosylated in fukutin patients. Proper αDG glycosylation is critical for maintaining the muscle cell membrane's association with the extracellular matrix (ECM) as the absence of sugar moieties prevents the αDG to ECM interaction, leading to decreased stability of the sarcolemma and increased muscle cell death. To expand our understanding of fukutin's role in αDG glycosylation, we will extract, purify, and identify proteins physically associated with fukutin. We used viral particles developed in-lab to deliver DNA encoding a tagged fukutin (3xHA) into fukutin-knockout mouse embryonic stem cells. From embryonic stem cell lysates, we have extracted fukutin and its associated proteins using the HA tag. Fukutin-associated proteins will be identified by mass spectroscopy, and known functions will be ascertained by database mining. Identification of fukutin binding proteins is critical to determining fukutin's function and developing therapeutic strategies for fukutin-dependent muscular dystrophy.

We Are All Royalty: Narrative Comparison of a Drag Queen and King

Joshua Trey Barnett, CURO Summer Fellow
Dr. Corey W. Johnson, Counseling & Human Development Services, College of Education

Drag performances have been studied as important visible cultural sites of gender transgression. Few studies, however, have sought to understand the ways in which drag performers—kings and queens—relate to and shape queer communities. In this manuscript we explore the narrative of a drag queen alongside a drag king in an effort to elucidate these relationships and the similarities and differences that become apparent between the two. Specifically, we are interested in how drag performers engage their drag personas for political and activist purposes as well as how the spaces they find themselves performing in influence their lived experiences. Seeking to understand drag performers through a genderqueer lens, which encourages engagement with the trans movement as a conduit for political expression, we employ narrative inquiry as a means by which to highlight and forefront the lived experiences of our participants.

Organizational Commitment in the Workplace

Brooke Bauer, CURO Summer Fellow
Dr. Robert Vandenberg, Management, Terry College of Business

Over the past thirty years commitment in the workplace has been researched and studied for the benefit of organizations. The results of measuring commitment in the workplace predict behaviors and attitudes of employees such as turnover, absenteeism, and performance. While the study of organizational commitment strengthens the organization's recognition of their employees' actions, the tools to measure commitment are highly outdated. The surveys used to measure commitment were developed during the post-depression era, and the questions within the survey focus more on earlier generations who were committed to their organizations for reasons that differ from the people entering in the workforce today. One of the most commonly used surveys is the Organizational Commitment Questionnaire. This questionnaire measures three different types of commitment: affective commitment, continuance commitment, and normative

commitment. What I question is how relevant each type of commitment is to society today, and if there is not another form of commitment that more accurately measures commitment in the workplace. One element that my mentor, Dr. Vandenberg, and I believe should be incorporated within the definitions of commitment is "transitional commitment," or the notion of remaining in an organization in order to further advance later in one's career. This past summer, Dr. Vandenberg and I created a new survey with additional questions on transitional commitment and sent the survey to full-time employees enrolled in the MBA programs at UGA. Currently, Dr. Vandenberg and I continue to question and quantify the significance of changed perceptions on attitudes in the workplace.

Vitamin D Deficiency in the African American Population

Anita Bhagavathula
Dr. Daniel Promislow, Genetics, Franklin College of Arts & Sciences

Vitamin D deficiency has been associated with Inflammatory Bowel Disease (IBD) in Caucasians. Hypovitaminosis-D is reported to occur among individuals of color including African Americans (AAs). One could hypothesize having two risk factors (IBD and AA race) would result in severe vitamin D deficiency. Our aims were to determine vitamin D status, as measured by 25-hydroxyvitaminD(25(OH)D) in AAs, and to compare these results to Caucasians with IBD. Serum 25(OH)D was determined in 86 AAs with Crohn's Disease(CD), 123 AA controls, and 62 Caucasians with CD(C-CD). Additional data (BMI, disease severity, and surgical history) were extracted following IRB approval. Vitamin D deficiency was defined as serum 25-hydroxyvitaminD≤20ng/ml based on the Institute of Medicine's dietary reference intakes. Vitamin D deficiency was present in 67% of AA-CD cases compared to 76% of the disease-free AA controls (P-value 0.17). Only 35% of C-CD had a vitamin D deficiency compared to 67% of AA-CD subjects (p-value <0.001). In addition, AAs-CD had much lower vitamin D levels (17.70ng/mL) than their Caucasian counterparts (24.38ng/mL) with the same diagnosis. Linear regression analysis showed that there were no differences in vitamin D levels among AA by BMI, disease severity, or surgical history. Vitamin D deficiency is common in all AA subjects. In addition, AAs-CD have almost 4 times greater odds of having vitamin D deficiency compared to Caucasians-CD (95% CI 1.89-7.50). Unlike in Caucasians, the vitamin D levels are not affected by disease severity or IBD phenotype in AA-CD. Further, prospective studies are warranted to better understand vitamin D metabolism in AAs.

Differences in Functional Movement Screen Scores Between Genders in NCAA Division I Athletes

Katherine Black
Dr. Cathleen Brown Crowell, Kinesiology, College of Education

Female athletes have documented differences in anatomical alignment of the lower extremity, and differences in strength may contribute to increased injury risk, including ligament sprains at the knee. The functional movement screen (FMS) is a quantifiable measure of athletes' performance in 7 fundamental movements. These include lunging, squatting, stepping, and stabilizing. Our objective was to determine if there was a significant difference between FMS scores of female and male NCAA Division I athletes. Differences in scores may provide rationale for increased injury risk in females. FMS data were obtained from males and females on the cross country, track/field, swimming, and tennis teams. Scores were totaled and averaged over genders across teams. Percent differences were calculated on the total and 7 individual sub-tests. A 49.0% difference occurred between male and female

scores on the push-up component of the FMS. Females had lower push-up scores than males. However, many of the female athletes had reported impingement pain while performing the task, so they were assigned a score of 0, not representative of their ability but of the presence of pain. The differences in the other tests were not clinically significant. It appears that male and female Division I athletes on those particular teams have comparable FMS scores in total and on sub-tests. The FMS may not provide rationale for or indicate why female athletes may be more at risk for specific injuries.

High Resolution Behavioral Economic Analysis of the Price Sensitivity of Smoking Cessation Motivation

Ashley Blackburn
Dr. James Mackillop, Psychology, Franklin College of Arts & Sciences

Tobacco use is the single largest cause of mortality in the United States, and understanding the factors that contribute to smoking cessation success is a priority for research. Previous research suggests that the cost of tobacco products plays an important role in successful smoking cessation. The purpose of this study was to better understand the relationship between cigarette price and smoking cessation motivation. A large sample of community smokers (n = 1074, 60.4% male, 67.5% Caucasian) were assessed using the Probability of Smoking Cessation Measure (PSCM), which assessed the estimated likelihood that an individual would quit smoking at a variety of cigarette prices ranging from free to $10/cigarette ($200/pack). Dependent variables from the PSCM included intensity (baseline quit motivation), breakpoint (price point corresponding to 100% quit probability), and P50 price (price point corresponding to 50% quit probability). Relationships between quit probability and demographic variables, measures of nicotine dependence severity, and self-reported smoking cessation variables were investigated. As anticipated, quit probability increased as a function of escalating cigarette price. Individual indices from the PSCM measure were correlated with each other (*r*s = .13-.45, *p*s < .001). Significant correlations were present between PSCM variables and a number of demographic and smoking variables. Higher nicotine dependence ratings were significantly associated with lower intensity (*r* = -.08) and higher P50 price (*r* = .10). These results provide further evidence that price plays an important role in smoking cessation motivation and that meaningful differences exist by nicotine dependence severity.

A Shot in the Dark: How Information Affects Consumer Light Bulb Purchases

Charles Blair III
Dr. Robert Nielsen, Housing & Consumer Economics, College of Family & Consumer Sciences

In light of the pending elimination of incandescent bulbs from the market to make way for less familiar, energy efficient light bulbs, I will investigate the role that information plays in the consumer's decision to purchase light bulbs by answering the following research question: *How does information affect consumers' decisions when purchasing energy efficient light bulbs?* This will be done through the execution of a controlled experiment using control and treatment groups. Participants in the study will be drawn from the UGA community (faculty, staff, and students) and will be randomly assigned to either the control or treatment groups. In each group, the participants will be shown five compact fluorescent light bulbs equivalent to 60-watt incandescent bulbs. Both groups will be encouraged to examine the product packaging and unit price before indicating their purchase choice from the selection. Treatment group participants will receive additional external information about the bulbs and explanation of the different

bulb qualities that are useful when shopping for light bulbs. It is anticipated that in the absence of more detailed information, consumers will decide based on price. However, when they receive more information, I expect them to choose the light bulb based on what characteristic they perceive to be most important, as well as comparisons and ratings provided by *Consumer Reports*. The findings will assist in the communication of pertinent product information and creation of a more consumer friendly market environment for light bulb purchases.

The Characterization of Long Flagella 4 Protein in *Tetrahymena*

Stephen Bocarro
Dr. Jacek Gaertig, Cellular Biology, Franklin College of Arts & Sciences

Cilia are microtubule-rich projections that determine a wide range of functions. Previous studies done in the flagellate *Chlamydomonas reinhardtii* identified LF4 (long flagella protein 4), a MAP kinase-like protein, as a negative regulator of cilia length. When overexpressed in growing *Tetrahymena thermophila*, GFP-tagged LF4 induced shortening of cilia associated with cell paralysis and arrest in cytokinesis (likely secondary to loss of cell motility). The phenotype of GFP-LF4 overproducing cells resembled that of mutants lacking the intraflagellar transport pathway (IFT), a pathway that operates within cilia and is required for ciliary assembly and turnover of ciliary proteins. This indicates that LF4 acts as an inhibitor of ciliary elongation and potentially an inhibitor of IFT. When GFP-LF4-overexpressed *Tetrahymena* were starved, the cilia showed paralysis but did not shorten. This suggests that in starved cells LF4 inhibits delivery of essential motility components, such as dynein arms. The paralysis phenotype may result from a higher turnover rate of dynein motors and relatively slow turnover of components required for ciliary elongation such as tubulin. Thus, LF4 could be a negative regulator of IFT, and its role in ciliary length regulation could be indirect due to its inhibition of IFT. Our goal now is to identify the specific protein(s) that is a substrate of phosphorylation by LF4. We will look for proteins that bind to LF4 using immunoprecipitation.

Outward Migration and the Kenyan Economy: Transforming the Brain Drain to a Brain Gain

Rachel Bonds
Dr. Jack Houston, Jr., Agricultural & Applied Economics, College of Agriculture & Environmental Sciences

The brain drain is a common phenomenon throughout the developing world, with Kenya sending some of the highest numbers of migrants from sub-Saharan Africa. Based on the assumption that the outward migration of Kenyan professionals will continue, this study will answer the following question: How can governments utilize the brain drain to maximize its economic benefits? Remittances are the most visible benefit of outward migration, representing an important source of foreign exchange, but additional benefits, such as an increased network of business professionals, also assist developing countries. This study will first identify these benefits with existing literature and economic modeling. Second, it will address policies that the government and the private sector can adopt to harness the positive externalities of the brain drain by examining the success of other developing countries' policies. Examples of potential findings include increased access and financing for higher educational research, the use of remittances to invest in education and business creation, and the utilization of the Kenyan diaspora to help finance development projects and raise awareness of domestic issues. This study is unique in economic policy and migration literature because it assumes the brain drain is a constant economic reality in the developing world. Using this assumption, this research

will make important advances on how the brain drain can be used to facilitate development in the sending country. Thus, it represents a departure from traditional brain drain research that focuses on how to inhibit the migration of professionals.

The New Western: Classical Genre Cinema in the 21st Century

Brendan Boyle
Dr. Christopher Sieving, Theatre & Film Studies, Franklin College of Arts & Sciences

The production of high-profile films in the Western genre has slowed dramatically since its classical period, from the 1940s to the early 1960s. Subsequent Hollywood-produced Westerns demonstrated strong revisionist tendencies and a critical attitude toward classical trends. Close viewings of several Westerns released in the last ten years, however, reveal a marked resurgence of interest in visuals and narratives which not only reference, but celebrate, the classical Western period. Additionally, a less conventional Western, Meek's Cutoff, turns a critical eye toward the cynical gender theory of the title character. These "New Westerns," viewed as a small, distinct group and removed from the glut of films released during the genre's Golden Age, demonstrate a reversal of revisionist attitudes in both mainstream and independent cinema. In particular, Meek's Cutoff, widely considered a "slow" and challenging art film, provokes with its dramatic breakdown of the Western form a consideration of the lingering potential of this neglected genre. The existence and box office success of more mainstream New Westerns prove these implications to be far more than idle musings or misplaced nostalgia.

Correlations Between Ankle Laxity and Dynamic Postural Stability

Jenny Brickman
Dr. Cathleen Brown Crowell, Kinesiology, College of Education

Ankle sprains are the most common injury in collegiate athletics, and approximately 40-70% of those who sprain their ankle will develop chronic ankle instability (CAI). CAI is defined as developing repetitive sprains and persistent symptoms after initial ankle sprain, and may be perpetuated secondary to laxity of the lateral ankle ligaments. Our objective was to determine if mechanical laxity secondary to sprain contributes negatively to dynamic postural stability. Twenty-three volunteer recreational athletes with a variable ankle injury history completed a jump landing task and had their ankle laxity quantified. Participants performed jump landings at 50% of their maximum jump height, and the dynamic postural stability index (DPSI) was used to quantify an individual's ability to maintain balance while transitioning from a dynamic moving state to a static standing state. Its four components include indices in the anterior-posterior (APSI), medial-lateral (MLSI), and vertical (VSI) directions. Higher scores indicated decreased dynamic postural stability. The Ligmaster instrumented arthrometer was used to measure ankle ligament laxity by measuring joint displacement to 150dN. Pearson bivariate correlation coefficients were calculated between DPSI indices and joint displacement. Composite DPSI was moderately significantly correlated to joint displacement ($r = 0.46$; $p < 0.001$). However, the directional dynamic balance indices, APSI, VSI, and MLSI were not significantly correlated with displacement. As laxity increases, so does composite DPSI, indicating that the ability to balance decreases. Increased laxity may play a role in development and perpetuation of CAI and may need to be addressed during rehabilitation to prevent later injury.

Abstracts

Insertion of Hemagglutinin Gene from H5N1 into Parainfluenza Virus Type 5 (PIV5) Offers Immunity in Mice Against H5N1 Challenge

Kathryn Briggs
Dr. S. Mark Tompkins, Infectious Diseases, College of Veterinary Medicine

Parainfluenza virus type 5 (PIV5) is a non-segmented, negative strand RNA virus in the Paramyxoviridae family. With few cytopathic effects on the host cell, PIV5 infects many cells types and lacks a DNA phase (excluding the possibility for viral gene insertion into the host genome). Importantly, while it is able to infect humans, it does not induce any known illness. To discern the viability of PIV5 as a vaccine vector, the hemagglutinin (HA) gene from highly pathogenic avian influenza virus (HPAIV) H5N1 was inserted into the PIV5 virion at various locations, taking advantage of the gradient of gene expression observed in paramyxoviruses. In the "base model" construct (ZL48), the transgene was inserted between the hemagglutinin-neuraminidase (HN) gene and the large (L) polymerase gene of PIV5. In the ZL46 construct, it was inserted closer to the leader sequence between the small hydrophobic (SH) gene and the HN gene. In the ZL47 construct, the transgene was inserted even further upstream between the V/P gene and membrane protein (M) gene. Insertion of the HA protein into PIV5 does not appear to increase virulence in mice and induces a robust immune response against influenza virus. The capacity for rPIV5-H5 as a live vaccine was examined in 6-8-week-old BALB/c mice, comparing the levels of transgene expression and assessing the dose required to elicit protection against HPAIV H5N1 challenge. Because gene expression in paramyxoviruses decreases in relation to proximity to the leader sequence, we expect the ZL47 construct to offer the best protection.

Black Stereotypes in Reality Television and the Reinforcement of Prejudiced Attitudes

Melissa Brown, CURO Summer Fellow, CURO Scholar Graduation Distinction
Dr. Kecia Thomas, Pscyhology, Franklin College of Arts & Sciences

Three studies examined depictions of Black Americans in reality television and factors that influence whether White Americans perceive these depictions as realistic. In Study 1, independent raters content analyzed reality dating shows. Depictions of Black Americans included invisibility, tokenism, stereotypical typecasting, and over-representation/idealization of the minority. In Study 2, 283 White undergraduate students viewed clips from four different shows before completing surveys of racial attitudes, interracial contact, and reality television show perceived realism. Afterward, they indicated their interest in engaging in interracial contact. Results indicated that shows depicting tokenism reduced a willingness to engage in interracial contact. Additionally, individuals who reported low interracial contact were more likely to perceive negative stereotypical images of Black Americans as true to life and support an anti-Affirmative Action petition. Stereotypical depictions of Black Americans viewed as "reality television" may fuel a self-perpetuating cycle of prejudice, stereotyping, and racial segregation that greater real-world interracial contact might counteract. Implications for stereotype maintenance, prejudice reduction, and the impact of television media on racial minorities are discussed.

Abstracts

Giving Voice to Silence: Theatre and Community in *He Said, She Said, Zhe Said: Gender Stories*

Tyler Bugg
Dr. Emily Sahakian, Theatre & Film Studies, Franklin College of Arts & Sciences

Community-based theatre is a field of arts practice in which theatre artists collaborate with people whose lives directly inform the subject matter to create collective meaning and heightened social dialogue about a social problem. This research explores the techniques of community-based theatre in the University of Georgia campus production of *He Said, She Said, Zhe Said: Gender Stories*. The production, authored and performed by the students of the university's Fall 2011 THEA4800 class, of which I was part, conducted surveys of scholarly writings and primary fieldwork in exploring issues surrounding themes of gender and sexuality. The research and fieldwork were then directly used in imagining, devising, and scripting stage scenes that responded to the discoveries within the research and fieldwork and employed community-based theatre techniques in communicating them to an audience. Now post-performance, this presentation aims (1) investigate how my particular research and fieldwork was transformed into a meticulously constructed scene entitled "26 Tellings: Rape on Repeat," (2) how it evolved within the context of the production's other pieces and broader message, and (3) based on observations from a post-show audience talk back, how the scene and its message were received by an audience. As a medium for dialogue and social and political engagement, the community-based theatre tactics used in the production represent a powerful method for facilitating a broader dialogue committed to social change on campus, in the surrounding community, and ultimately across the world.

'All Truth is Bitter': Legacies of a Post-Apartheid, Post-TRC South Africa

Tyler Bugg
Dr. Stacey Mitchell, International Affairs, School of Public & International Affairs

Early twentieth-century apartheid South Africa, defined by a systematic control of race relations in the hands of the intellectual and political elite, evolved into the darkest blot on the history of South Africa's reputation. Although the institutions of apartheid were abolished in the early 1990s, the legacy of apartheid continues to pervade political, economic, and cultural life in South Africa. This presentation seeks to examine how the ideologies that validated apartheid have been replicated in contemporary South African society, stunting the objectives of the country's Truth and Reconciliation Commission (TRC) in normalizing a post-racial, post-conflict society. The research takes a multi-sourced approach: surveys of scholarly writings addressing apartheid's long-term effects, collections of popular fiction, poetry, and media portrayals of apartheid, and primary court and victim testimony shed new light on the conditions of inequality at the center of apartheid, conditions that continue to divide a country along racial, ethnic, and socioeconomic lines. Analysis of each indicates that crime, rape, and assault rates are still among the world's highest; the government's deceptively progressive constitutional reforms are largely unseen; and poorly funded education and agricultural systems are largely ineffective and unequal. The resulting culture of inequality perpetuates the same rhetoric and ideology that sustained systems of apartheid for decades. In understanding the factors that made apartheid a force of power just a few decades ago, the hope for continuing to correct past wrongs and forge progress can be more positively and thoroughly fulfilled.

Abstracts

Anesthetic Complications in Dogs Undergoing Surgery for Liver Disease

Brigid Burns
Dr. Erik Hofmeister, Small Animal Medicine & Surgery, College of Veterinary Medicine

Liver disease affects several body functions of an animal that are important to consider from an anesthetic standpoint. A dog with ongoing gallbladder issues, such as cholecystitis (inflammation), rupture, or cholelithiasis (stones) associated with disease may undergo a cholecystectomy, in which the gallbladder is completely removed. Clinical experience has shown that patients with gallbladder disease have a higher risk of anesthesia complications, including a noticeable drop in blood pressure. This retrospective case-control study compared surgical records of dogs of similar breed, age, and weight that underwent liver surgery at the Small Animal Teaching Hospital at the University of Georgia to determine different rates of anesthesia complications between dogs that have their gallbladders removed and dogs that do not. Our hypothesis was that dogs that have their gallbladders removed would have a higher rate of anesthesia complications than those that do not. In order to detect possible correlation between cholecystectomies and anesthesia complications, we analyzed certain anesthesia-related variables in the hospital medical records. If there is any association upon completion of this study, in the future, anesthetists may be able to better predict any complications that may arise during liver or gallbladder-related procedures and develop a more efficient plan of action before the time of surgery. This study will also help the veterinary community better understand the role of the gallbladder and the effects of its removal in the dog.

Comparative Genomics of Ribosomal RNAs in Malaria Parasites

Allyson Byrd
Dr. Jessica Kissinger, Genetics, Franklin College of Arts & Sciences

Ubiquitous to all life, ribosomal RNAs (rRNAs) are components of protein-synthesizing ribosomes. In previously studied eukaryotic genomes, genes encoding rRNAs are distributed in multiple high-copy tandem arrays, each of which can contain dozens of copies of the rRNA three gene casette (18s, 5.8s, and 28s). Genome sequences from the parasitic genus *Plasmodium,* the causative agents of malaria, are atypical, differing in the copy number and organization of rRNA genes. There are only 4-8 non-tandem gene casettes per genome. *Plasmodium* species are also unique in having divergent rRNA genes that are differentially expressed during parasite developmental stages. The evolutionary history and genome biology of rRNAs within the *Plasmodia* have historically been under-investigated. I have used computational methods to investigate rRNAs from the sequenced genomes of the human-infecting *P. falciparum, P. knowlesi,* and *P. vivax,* and the rodent-infecting *P. berghi* and *P. chabaudi.* I have mined sequence, expression, and synteny data to identify full-length and partial rRNA genes in each genome. Curated genes were used to compare and contrast rRNA complements, distributions, secondary structures, and evolutionary histories within and between species, providing novel information on *Plasmodium* rRNA biology. Eventually, a better understanding of the nuances of *Plasmodium* rRNA biology and their role in parasite development may aid in determining their potential as antimalarial targets.

Abstracts

The Role of Coagulation in Cerebral Malaria in the Mouse Model

Kelsey Campolong
Dr. Julie Moore, Infectious Diseases, College of Veterinary Medicine

Malaria caused by *Plasmodium falciparum* continues to be a major health concern, with nearly one million fatalities yearly. In severe manifestations, parasites adhere to the cerebral blood vessels. This condition is called cerebral malaria (CM) and typically occurs in children under five years. Although full recovery is possible, many patients die, and about one in four CM survivors suffers from long-term cognitive deficits. The development of CM is not well understood since it is difficult to study in humans; however, *Plasmodium berghei* ANKA infection in laboratory mice parallels the human disease. Coagulation in cerebral blood vessels is one mechanism thought to be involved in CM development. This study investigates the role of tissue factor, the protein that activates the coagulation cascade, in disease pathogenesis. Experimental mice genetically modified to lack mouse tissue factor (TF) and express 1% of the normal level of human tissue factor (low TF mice) were paired with control TF-intact mice. Following infection with *P. berghei* ANKA, mice were evaluated daily with behavioral and neurological tests. Test results indicating development of CM triggered immediate euthanasia. Non-CM mice were euthanized after twelve days. A total of 15 mice were infected: seven low-TF mice and eight control mice. Ten of the infected mice developed cerebral malaria by day six post-infection. Of the remaining five, three expressed low levels of TF. This preliminary data demonstrates that reduced levels of TF may offer protection against CM, but further experimentation is necessary.

Arterial Flow Pattern in People with Peripheral Arterial Disease

Neal Canlas,
Michael Theobald
Dr. Kevin McCully, Kinesiology, College of Education

Peripheral arterial disease (PAD) is a major form of vascular disease that contributes to poor health and a lower quality of life. A limitation to treating PAD is the imprecision of current detection methods. Previous studies have reported greater turbulence and velocity as well as a slower time course of reactive hyperemia. The current study analyzed the data from a previous study (6 subjects with PAD and 14 without PAD) and had two aims: 1) compare analyses of flow velocity data between a custom-written MATLAB program and the built-in ultrasound analysis program; 2) investigate the relationship between time course of reactive hyperemia as analyzed by the custom-written program and PAD severity measured with Ankle Brachial Index (ABI) test. A strong correlation was found between the two analysis programs when examining the time to peak ($R2 = 0.99$) and time to half-returned velocity ($R2 = 0.94$) in the femoral artery, suggesting that the custom-written program is a valid analysis technique. A moderate correlation was observed for both ABI compared to time to half-returned ($R2 = 0.4$) and time to peak velocity ($R2 = 0.6$), suggesting that time course of reactive hyperemia is a potential indicator of the disease severity. Subjects with a wider range of PAD severity will be needed to further confirm the correlation between the time course of reactive hyperemia and PAD severity.

Abstracts

Mating Regulates Germ Line Stem Cell Division Frequency in Testes of *Drosophila melanogaster*

Vinay Choksi
Dr. Cordula Schulz, Cellular Biology, Franklin College of Arts & Sciences

The replenishment of cells, such as skin cells, depends on the activity of stem cells. How stem cells divide to respond to the demand for specialized cells is not well understood. To explore this question, we use the model organism *Drosophila melanogaster*. In *Drosophila* testes, sperm cells are reproduced from germline stem cells (GSCs). To investigate if GSCs respond to the demand for sperm, we exposed males to females and control males and found that males have a significant increase in GSC division frequency in the presence of females compared to males. To explore possible pathways regulating this response, we investigated the effect of cuticular hormones on GSC division frequency. Cuticular hormones are signaling molecules that act as cues for mate choice. *Drosphila* males exposed to female cuticular hormones displayed an increase in GSC division frequency compared to males exposed to male cuticular hormones. We conclude that the presence of females induces a pathway that regulates SC division frequency in response to mating. Next we asked if mating leads to an increase in GSC division frequency. Mating behavior depends on the activation of specific neurons called fruitless neurons. Male fruitless mutants are not able to differentiate between sexes and attempt mating both sexes. Fruitless mutants also displayed an increase in GSC division frequency, suggesting that these neurons are part of the regulatory circuit for the response of the GSC to mating. The future direction of these experiments is to deduce the biological pathway that leads to GSC division.

Algae Biofuel Development: Growth Efficiency

William Costanzo, CURO Summer Fellow
Dr. K.C. Das, Biological & Agricultural Engineering, College of Agriculture & Environmental Sciences

The government has officially made the call for biofuels to replace traditional gasoline fuels. The Energy Independence and Security Act, passed in 2009, calls for "32 billion gallons of biofuels to be produced per year by 2022." Many of the traditional biofuel sources are either not efficient enough (energy density and productivity are too low) or would require too much of the U.S. cropland to be effective, Algae biomass is an attractive source for biofuels that concurrently satisfies both of those requirements. Previous work has shown that the biochemical stimulant *Naphthalene Acetic-Acid* (NAA) can cause the algae to grow at higher productivities and with more lipid content than when grown without the biochemical stimulant. My research sought to determine whether microalgae grow more effectively if that stimulant is administered as a single dose on a particular non-starting day of the 10-day cycle or as smaller doses spread over a period of time within the growth cycle. Across five different species (*Cso, Av, Ns, Db, Sb*) it was determined that adding *NAA* on a day other than day 0 (depending on the type of algae) produced the best increase in growth. Each species also concluded their cycles with an overall lipid content higher than that of the control. An average productivity increase of nearly 25% for all samples can be obtained with an additional cost of only $1.20/gram of stimulant (price of stimulant may vary depending on vendor).

Abstracts

Racial Inclusivity and Exclusivity in HBO's *True Blood*: A Viewer-Response Critique via Hans Robert Jauss's "Horizon of Expectations"

Elizabeth Crowley
Dr. Michelle Ballif, English, Franklin College of Arts & Sciences

In recent years, vampire fiction has swept the main stage of popular culture. Works like *Twilight* and *The Vampire Diaries* have embraced this trope, as *Dracula* did years before. Alan Ball's television series *True Blood*, though, is quite different from the other, largely simple, contemporary vampiric narratives. Although some critical work has been done on the series, especially in reference to LGBT parallels, no scholarship has yet examined how the show treats the two complex and opposing planes of humanity and supernaturalness. The human plane parallels a current colorblind ideology of complete inclusivity, while the supernatural one parallels historical periods of complete disenfranchisement—pre-Civil Rights America, the Holocaust, etc. The purpose of this study is to examine how the viewer uses this duality to interpret the series as a whole. Using Hans Robert Jauss's theory of reader response—"horizon of expectations"—I explore how these historical and contemporary references influence a viewer's interpretation. Ultimately, this thought experiment demonstrates a viewer's response to the human plane as an identification of the impracticality of a completely colorblind world and to the supernatural plane as an identification of the injustice of discrimination. The result of combining both interpretations is that the viewer paradoxically discerns a fictional/human plane and a non-fictional/supernatural one. This understanding revitalizes Jauss's theory, explains the complexities of *True Blood*, and encourages similar studies on other popular media outlets.

Proteomic Analysis of the Tomato/ *Botrytis cinerea* Interaction

Dervin Cunningham, Jr., CURO Honors Scholar, CURO Summer Fellow
Dr. Carl Bergmann, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

*Botrytis cinere*a attributes to the post-harvest rot of more than 200 species of fruit and vegetables. As these produce ripen, their cellular wall drastically degrades, making them more susceptible to pathogens. Significant protein-protein interactions occur between the necrotrophic fungal pathogen, *Botrytis cinerea* (*B. cinerea*), and the tomato fruit. By describing host and pathogen proteomes simultaneously in infected tissues, the plant proteins that provide resistance and allow susceptibility and the pathogen proteins that promote colonization and facilitate quiescence can be identified. This study aimed to characterize the fruit and fungal proteins occurring in the *B. cinerea*/tomato interaction using shotgun proteomics. Mature green, red ripe, wild type, and *rin* and *nor* mutant tomato fruit were infected with *B. cinerea* B05.10. After 5 days the infected tomatoes were gently agitated in a 1.5M NaCl solution followed by a SDS and heat treatment to collect solubilized proteins. The collected proteins were separated on a one dimensional SDS-PAGE gel, followed by in-gel digestion. Peptides were then analyzed by LC-MS/MS on a linear ion trap mass spectrometer. Data was searched using Mascot algorithm. Proteins were identified by combining the *B. cinerea* BO5.10 (Broad Institute, MA), and T4 databases (Genoscope, France) with a tomato protein database (SOL Genomics Network, Cornell University, NY). A decoy database was constructed by reversing the sequences in this target database. Statistically significant proteins were determined at a 1% protein FDR. The composition of the collected proteins populations and their putative functions allow for a better understanding of

the plant-pathogen interaction mechanism.

A Therapeutic Nanoparticle Platform for Targeting Mitochondrial Superoxide

Kasey Darley
Dr. Shanta Dhar, Chemistry, Franklin College of Arts & Sciences

Mitochondrial superoxide (O2-) has been implicated in the pathogenesis of human diseases including aging. It is important for the development of oxidative stress, and antioxidant strategies specifically targeting this organelle could have therapeutic benefits. One challenge of therapeutics targeting mitochondrial dysfunction is distributing drugs to the organelle. Commonly used antioxidants have proven ineffective in clinical trials because these agents are not adequately delivered to the mitochondria. Emerging insights into the molecular pathogenesis of aging suggest that inflammatory processes promote aging. We postulated that mitochondrial targeting of superoxide scavenging would have possible effects such as anti-aging, and the development of organelle-targeted delivery of antioxidants combined with anti-inflammatory agents could incite new therapeutic approaches to the anti-aging of cells. We speculated that a nanoparticle platform based on functionalized polymers could be beneficial for mitochondria-targeted anti-aging strategies. The biodegradable polymer poly (lactic-*co*-glycolic acid) (PLGA) is capable of encapsulating small- and macro-molecular payloads with a wide range of physicochemical properties, releasing them in a regulated manner. Polyethylene glycol (PEG) is a biocompatible polymer that promotes long-circulating nanoparticles and is used to create biodegradable PLGA-*b*-PEG copolymers possessing terminal lipophilic ligands, which can cross into the mitochondrial matrix space. These polymers will be blended to nanoparticles encapsulating combinations of antioxidants and anti-inflammatory agents by mixing targeting ligand-functionalized polymer with PLGA-*b*-PEG-OH. By combining controlled release polymer technology and targeted delivery approaches, we aim to deliver antioxidants to the mitochondria of cells along with anti-inflammatory agents in a regulated manner resulting in a more effective management of aging.

An Alternative Perspective?: Dora Mayer's Contributions to the Peruvian *Indigenismo* Movement

Ruth Davis
Dr. Oscar Chamosa, History, Franklin College of Arts & Sciences

The Peruvian *indigenismo* movement, spanning roughly from the 1880s until the 1950s, centered on the social and economic empowerment of the Peruvian indigenous peoples. During the 1920s and 1930s, under the influence of Marxists such as José Carlos Mariátegui and the often subversive rhetoric of Luis Eduardo Válcarcel, two of the most influential *indigenistas* during this period, participants in this movement acquired a particularly revolutionary character. In contrast, Dora Mayer de Zulen, one of the co-founders of the *Asociación Pro-Indígena* [The Pro-Indigenous Association] and a contemporary of these *indigenistas*, rejected revolution and condemned Marxism as another example of Western hegemony and instead opted for a more legalistic approach to socially uplift indigenous Peruvians. However, Mayer's writing was not limited to discussion on the plight of the indigenous peoples but also explored national and international intellectual currents, international policy, the World Wars, the War of the Pacific, and workers' rights. Nevertheless, while she was certainly a prolific writer and an active agent for national and international change, Mayer's contribution to the *indigenismo* movement was and has remained largely underappreciated. I am interested in examining how her marginalized position within the intellectual field of *indigenismo* interacts with the

expression of her ideas by comparing her nationalistic ideologies and opinions on the revival of the indigenous peoples of Peru to those of her contemporaries. Particularly, I am curious to explore how her position as a female, an immigrant, and a *limeña* [Limenean] seem to motivate these differences.

Do Mushroom-Feeding *Drosophila* Self-Medicate with Alpha-Amanitin in Response to Nematode Parasitism?

Catherine Debban, CURO Scholar
Graduation Distinction
Dr. Kelly Dyer, Genetics, Franklin College of Arts & Sciences

Behavioral adaptations to parasites form an important component of host-parasite interactions. Self-medication is a behavioral adaptation in which animals change their feeding preferences in response to parasitism, resulting in decreased parasite virulence or transmission. Since mushroom-feeding *Drosophila* can tolerate the usually deadly toxin alpha-amanitin, but their *Howardula* nematode parasites cannot, I tested whether these flies might use the toxin to self-medicate in response to infection with nematodes. In this study, I used *Drosophila putrida* and *Howardula aoronymphium* to explore whether alpha-amanitin cures flies infected by *Howardula*, whether alpha-amanitin harms uninfected flies, and whether infected flies have an increased preference for alpha-amanitin. In addition, I tested whether flies from populations inside and outside the range of the nematodes have different toxin preferences. Considering the results of this study, it is unlikely that the flies self-medicate using alpha-amanitin. However, since there is some difference between the toxin preferences of flies from inside and outside the range of nematodes, it is possible that the flies somehow use the mushrooms to protect their offspring from nematode infection.

The Responsiveness of Mothers in Organic and Inorganic Nutrition in Ghanaian Children and the Social and Economic Implications

Tanya Dieumegarde
Dr. Alex Kojo Anderson, Foods & Nutrition, College of Family & Consumer Sciences

The objective of this study was to assess mothers' perceptions of the causes of their child's malnutrition and thus their responsiveness to the child's condition. This was a qualitative, cross-sectional study. In-depth interviews were conducted with mothers of children diagnosed with organic (n = 2) and inorganic (n = 6) malnutrition, as well as reviewing their medical chart for data extraction in the only children's hospital in Ghana. This was done in concurrence with the nutritional rehabilitation program of the Nutrition Rehabilitation Clinic. Of the eight mothers with malnourished children observed and interviewed, only one correctly attributed poor nutrition as the cause of malnutrition and admittance to the hospital, while the remaining seven did not have any idea of the role of nutrition. Overall, mothers of the organic cases were more responsive to the nutritional care of their child at the clinic, while some of the mothers of the inorganic cases withheld the PlumpyNut supplied by the clinic. This observation was consistent with the rate of recovery of the two organic cases compared to their inorganic counterparts, according to their respective medical charts. Our observation and interaction with the mothers suggested a lack of nutrition knowledge and awareness in child feeding. There is therefore a need for nutrition education in the area of child feeding in resource-poor areas and a rehabilitation program that strictly requires mothers' involvement.

Abstracts

The Role of Galacturonosyltransferase in the Acetylation and Methylation of Homogalacturonan During Pectin Biosynthesis

Alexandra Dodd
Dr. Debra Mohnen, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Homogalacturonan (HG) is an essential glycan domain in plant cell wall pectic polysaccharides. This project explored the range of enzymes activities that modify HG during synthesis, specifically, the addition of acetyl and methyl groups. Labeled HG oligosaccharides (oligogalacturonides, OGAs) were created by reaction with fluorescent 2-amino-benzamide. The resulting 2-AB-OGA was incubated with UDP-GalA and galacturonosyltransferase (GalAT) present in an SP-Sepharose purified solubilized membrane fraction from Arabidopsis suspension cultured cells which contains the GAUT1:GAUT7 GalAT complex. The fluorescently labeled-OGA was used as substrate to detect HG methylation and acetylation activity. Fluorecently labeled OGAs were incubated with crude microsomal membrane fractions, SP-Sepharose purified GAUTs, and GAUT1/GAUT7 complexes immunoprecipitated using monoclonal antibodies against either GAUT1 or GAUT7. Small scale reactions were used to verify enzymatic activity by polyacrylamide gel electrophoresis (OGA-PAGE), and large scale reactions were carried out with verified enzymes. The resulting product was eluted through a size-exclusion chromatography column and analyzed using thin- layer chromatography. Analysis by matrix-assisted laser desorption/ionization mass spectroscopy revealed the size of the labeled OGAs and the presence of acetyl groups, providing evidence for acetylation by native enzymes during HG production. Up to eight GalA residues with four acetylations have been observed thus far. Ultimately, our goal is to determine whether GalA addition is concurrent with the acetylation or methylation steps in HG biosynthesis. Knowledge about the enzymatic activity that builds pectic polysaccharides as well as other plant cell wall polymers may provide information needed to support the development of a sustainable bioenergy economy.

The Sweet Connection: O-linked β-N-Acetylglucosamine Transferase and Cancer Stem Cells

Sarah-Bianca Dolisca
Dr. Michael Pierce, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

There is increasing evidence that a variety of cancers are initiated and maintained by a small proportion of cells called cancer stem cells (CSCs). Recent results from our lab show that deletion of GnT-V, which catalyzes a specific modification of N-glycans with β(1,6) branching, reduced the size of the compartment of CSCs in the her-2 mouse model, consequently leading to inhibition of tumor onset. O-linked β-N-Acetylglucosamine Transferase (OGT) is an enzyme that catalyzes the transfer of O-linked β-N-Acetylglucosamine (O-GlcNAc) from Uridine Diphosphate N-Acetylglucosamine (UDP-GlcNAc) to serine and theronine residues of target proteins. OGT is upregulated in metastatic cancer cells in a highly context-dependent manner that may serve as a mechanism that enables tumorgenesis. The notable characteristic of cancer phenotype further supports the hypothesis of OGT's involvement in oncogenesis because the switch from oxidative phosphorylation to glycolytic pathway at the cellular level produces an increase in the necessary intermediates for the hexosamine biosynthetic pathway (HBP). HBP increases the amount of O-GlcNAc, an intermediate that induces the activity of OGT. In the present study, small interfering RNA is used to reduce OGT gene expression in colorectal and mammary cell lines. A series of comparative experiments will be conducted

on the control and cancerous cell lines to support the working hypothesis that downregulation of OGT will decrease the metastatic properties of cancerous cells by regulating the population of CSCs and ultimately bring insight about the link between OGT activity and CSCs maturation and proliferation.

Increasing Access to Primary Care for Low-Income Rural Georgians

Allison Doyle
Dr. Richard Schuster, Health Policy & Management, College of Public Health

A lack of primary care infrastructure and accessibility to affordable health care is a leading cause of adverse health outcomes in rural areas nationwide. In rural Georgia counties, this lack of infrastructure impedes access for all rural Georgians but most acutely for low-income, uninsured and underinsured Georgians, who have even more limited health care options. Rural Georgia counties have higher rates of chronic diseases and uninsured patients. They also have substantially higher rates of hospital emergency room usage by the uninsured than in metropolitan counties, indicating a lack of options in seeking health care. This paper examines three policy alternatives that Georgia state and local health care authorities can pursue to increase accessibility to health care in rural counties through the augmented use of federally qualified health centers (FQHCs). As they must provide health care services regardless of ability to pay, FQHCs are an optimal mechanism for providing high-quality health care to low-income populations and are heavily invested in by the Affordable Care Act. The effectiveness of the policy alternatives are evaluated through an analysis of health outcomes in several case studies according to four criteria: cost of policy implementation, increased quality of care provided, increased accessibility to health care, and political feasibility. The analysis indicates that when rural FQHCs and local rural hospitals pursue a policy of collaboration, they can provide expanded health care accessibility to the underserved in rural communities while strengthening their vital role in the rural primary care safety net.

Effect of Anesthetic Variables on Recovery Time in Dogs

Katrina Egan
Dr. Erik Hofmeister, Small Animal Medicine & Surgery, College of Veterinary Medicine

Knowing the most efficient route to recovery is important because not only does it help the aesthetician, it can reduce the amount of postoperative morbidity and mortality. The purpose of this retrospective study was to determine all the variables that may be associated with anesthesia recovery and see how they affect the speed of recovery in dogs that were anesthetized with isoflurane, desflurane, or sevoflurane. The hypothesis was that temperature, health status, anesthesia duration, and type of procedure would help predict the best route to recovery. Anesthetic records of dogs treatd at the Veterinary Teaching Hospital at the University of Georgia between July 1, 2008 and June 30, 2011 were included in evaluation for this study. Multiple linear regressions using backwards elimination were used to build a model for recovery, using all other measured variables as independent variables. For these data, significance was set at $p < 0.05$. The adjusted R2 value indicates how much variance in the dependent parameter is explained by the model. Nine hundred dogs were included in the study. The final model for predicting recovery time had an R2 of 0.117 with weight, acepromazine administration, and hypotension being significant predictors for a longer and butorphanol and propofol administration for a shorter recovery time. In conclusion, anesthesia-related variables had a significant but minor effect on recovery time. Only about 12% of recovery time was due to these anesthesia-related variables. This means that

the other percentage was due to other, unknown variables.

Production of Saccharification Enzymes by Recombinant Fungus Grown on Pectin-Rich Biomass Materials

Abid Fazal, CURO Summer Fellow
Dr. Joy Peterson, Microbiology, Franklin College of Arts & Sciences

Pectin-rich biomass such as sugar beet pulp (SBP), citrus waste, and apple pomace contain 15-30% pectin, a polymer of galacturonic acid. These materials are viable feedstock sources for alternative fuels, as they are not used for human consumption. In order for these feedstocks to be used, the polymers must be hydrolyzed so that monomeric sugar molecules are released, which the ethanologen can ferment. Commercial enzymes such as pectinase, cellulose, and hemicellulase are required to degrade the plant polymers, which increases the price of industrial ethanol production. Commercially, cellulase and hemicellulases are produced from the ascomycete *Hypocrea jecorina* and pectinase from *Aspergillus* species, as wild type *H. jecorina* produces insufficient amounts of pectinase. Thus, *H. jecorina* Rut-C30 was genetically engineered for the production of pectinase (Pec2) using the microprojectile bombardment method. Upon purification of the recombinant polygalacturonase enzyme (Pec2), the optimal pH and thermal stability was studied by measuring enzyme activity and compared against *A. niger* polygalacturonase (ANP). The recombinant conidia spores were grown in 5L flasks of SBP media containing lactose (as *cel7A* inducer), stabilizers, and other nutrients under saturated oxygen conditions with continual agitation at 28°C. After 7 days of proliferation, the enzyme cocktail was harvested and characterized for the production of a variety of saccharifying enzymes. Under similar conditions of growth, the recombinant strain of *H. jecorina* produced larger amounts of pectinase than its wild type counterpart. Further studies with this recombinant fungus can help decrease ethanol production costs, making ethanol a more efficient alternative to fossil fuel.

Influence of Different Cell Storage/Culture Conditions on Spontaneous Proliferation and Tyrosine Kinase Receptor Inhibition in Two Feline Injection-Site Sarcoma Cell Lines, In Vitro

Brittany Feldhaeusser
Dr. Robert Gogal, Jr., Anatomy & Radiology, College of Veterinary Medicine

Optimizing cell culture conditions is important when studying cell proliferation and viability, particularly when evaluating response to cytotoxic compounds. Situations can arise in which these cells are stored at less than optimal conditions prior to culture. A change in cell storage conditions can adversely impact proliferation and viability in mortal cell lines. However, little is known regarding the effects on immortal feline cell lines. In the present study, two feline injection-site sarcoma cell lines (KH and Hamilton) were evaluated under standard culture conditions and 3 alternate storage/culture conditions for spontaneous proliferation rate and sensitivity to a novel tyrosine kinase inhibitor, which was assessed by 7-aminoactinomycin D and cytology. Spontaneous proliferation did not differ across various FBS concentrations; however, the standard and delayed techniques showed higher rates of spontaneous proliferation, suggesting a need for prior cell attachment. When normalized to cells untreated with masitinib, the IC50 values for masitinib were comparable across all the different culture techniques. Our preliminary findings suggest that select feline sarcoma cell lines can be subjected to various storage/culture conditions yet yield similar proliferation and cytotoxicity data.

Abstracts

Identification of GABA-Responsive Neurons in the Zebrafish Brain
Hope Foskey, CURO Honors Scholar
Dr. Jim Lauderdale, Cellular Biology, Franklin College of Arts & Sciences

Over 2 million people in the United States have experienced unprovoked seizure activity or been diagnosed with epilepsy. While medication has been developed that can help some people control their seizures, the mechanism by which seizures occur is not well understood. Zebrafish (*Danio* rerio) is emerging as a vertebrate model in the study of seizure disorders. Seizures in zebrafish can be induced by exposure to the chemoconvulsant pentylenetetrazol (PTZ). PTZ blocks the A and C receptors of the major inhibitory neurotransmitter in the brain, GABA (GABAAR and GABACR). However, the neural circuits by which PTZ propagates seizure activity are unknown. The purpose of my experiments was to identify the neurons likely to be involved in generating PTZ-induced seizure activity. To do this, an adult zebrafish brain was cryosectioned transversely, and GABA-responsive neurons were identified by immunolabeling for GABAAR, GABA, and GAD65/67. GAD is the enzyme that catalyzes the decarboxylation of glutamate to GABA. Additionally, neurons that exhibited high levels of electrical activity during seizure were identified by immunolabeling for *c-fos*, a protein whose expression in neurons is increased when under stress. These experiments identified for the first time the neural pathways in the zebrafish brain that are affected by PTZ and provided insight into the pathways that normally are affected in human seizures.

Segregation in a Modern Age: Systematic Patterns and Consequences
Emily Fountain
Dr. Charles Bullock, Political Science, School of Public & International Affairs

This paper details the history of the desegregation of Tattnall County, GA, specifically examining the "deliberate speed" with which county schools complied with Brown v. Board of Education, as well as the emergence of a local private school and its impact on the local school system in terms of test scores, dropout rates, and graduation rates. A series of interviews with former students and school officials, from the public and private institutions, were conducted, yielding important perspective on history and attitudes, as well as relevant data on graduation rates, dropout rates, and test scores. Additional statistical information was collected from public records. The collected data suggests that desegregation led to the formation of a local private school, which may serve as a persistent form of segregation, especially with regards to class.

Infection Modifies the Effects of Stress on Immune Function in Birds
Melanie Fratto, CURO Summer Fellow
Dr. Vanessa Ezenwa, Odum School of Ecology

A paradox of the immune response to stress is that, under stress, the ratios of phagocytic leukocytes increases, but the ability of blood cells to kill bacteria decreases. In this study, house finches, *Carpodacus mexicanus,* infected with *Mycoplasma gallisepticum* and ones with no obvious infection were captured to study this paradox. This bacterial infection is common among finches and can be spotted by the development of red, swollen eyes. The effect of stress from capturing and holding wild house finches for two hours was assessed by counting white blood cells and running an assay in which plasma is exposed to E. coli to measure the innate killing ability of blood. The ratio of heterophils to lymphocytes is an accurate measure of stress and is frequently used in stress studies, and this ratio was compared in pre-stress and post-stress samples from the same bird. The results of this study show that the two hour holding period increased the stress levels of both

infected and uninfected birds, and that an existing infection alters the effects of stress on immune function. This study will add to the current understanding of how stress affects an animal's immune function and, therefore, risk of infection.

A Portrayal of Power: Black Nationalism in the Documentary *Now is the Time*

JoyEllen Freeman, Foundation Fellow, CURO Honors Scholar, CURO Summer Fellow, CURO Scholar Graduation Distinction
Dr. Barbara McCaskill, English, Franklin College of Arts & Sciences

"Now is the time." This phrase embodies the impatience that simmered within the black community during the late 1960s. Due to the slow progression towards racial equality and the subsequent emergence of Black Nationalism, many African Americans began to focus less on racial integration and more on racial solidarity as a means of achieving social justice. Hence, various media sources attempted to portray this new mood within the African American community by associating negative images and language with the Black Power Movement. The 1967 documentary *Now is the Time*, however, takes a different approach to Black Nationalism. Using microfilm copies of twentieth-century newspapers such as the *Philadelphia Inquirer* and the *New York Times*, multiple anthologies of African American literature, and scholarly books about Black Nationalism, I have found that *Now is the Time* uses selected works of canonized African American writers to legitimize the Black Power Movement. Although the film fails to include the voices of early African American writers, most likely due to the paucity of available sources, the words of writers such as Paul Laurence Dunbar (1872-1906), James Baldwin (1924-1987), and Langston Hughes (1902-1967) show that resistance and anger have characterized the African American experience since the earliest days of slavery. Examining *Now is the Time*'s normalization of Black Power addresses the conflicting portrayals of this movement in the late twentieth century and simultaneously probes questions about the way in which media sources portray Black Power in the post-Civil Rights Movement era.

The Effect of Protein Kinase Inhibitors on the Growth of *Plasmodium Falciparum*

William French,
Ryan McLynn
Dr. David Peterson, Infectious Diseases, College of Veterinary Medicine

Malaria is a serious, life-threatening disease that plagues the tropical areas of our planet, causing over 1 million deaths among adults and children annually. While treatments and medicines are available to combat the parasite that causes malaria in humans, *Plasmodium falciparum*, the issue of drug resistance is a dangerous problem in the effort to eradicate this disease. This research project, then, explores the effectiveness of recently developed protein kinase inhibitors on the prevention on *P. falciparum* growth. The project thus far has consisted of tests involving two of these drugs, which were originally developed for cancer therapy, with the hopes of their use in malaria treatment. *P. falciparum* parasites were grown *in vitro* and assessed for growth in micromolar and nanomolar drug concentrations over various time periods. The first drug, Sunitinib (generic name Sutent), is a receptor tyrosine kinase inhibitor and in these low concentrations clearly inhibited parasite growth. The other drug of interest, Akt inhibitor-IV, targets serine-threonine kinases and also demonstrated an ability to inhibit parasite growth at low drug concentrations. The experiments run as a part of this project, once the inhibiting effects of these drugs were observed, suggested an IC50 value for Sutent against *P. falciparum* of around 0.1 uM in a 4% hematocrit solution. The IC50 value for AKt inhibitor-IV appeared to be the same.

However, the exact mechanism of these drugs is unknown, and further studies are currently underway to determine whether the drugs have a target within the parasite or in the erythrocytes they invade.

Landscapes of the Interior: Ethnobotany and Senses of Place Among Karen Refugees

Terese Gagnon
Dr. Virginia Nazarea, Anthropology, Franklin College of Arts & Sciences

Though few are aware, Athens, Georgia is home to a small community of Burmese political refugees of the Karen ethnic group. Forced to leave their homeland by ongoing government persecution, they continue the process of remembering and reaffirming their cultural traditions while seeking meaning and belonging in their new environment. Through engaging in interviews and gardening practices with the Karen people, I seek to examine the anthropological phenomenon of the 'landscape of the interior,' particularly as experienced from a transnational perspective. Recognizing the value of preserving genetic biodiversity alongside culturally situated knowledge, I will record--through the process of memory banking--ethnobotanical traditions of the Karen and their cultural relationship to the natural environment. With information obtained from interviews I plan to produce a register of Karen plant species, including their characteristics, methods of cultivation, uses, and religious/cultural significance. In order to facilitate the clarity of interviews and build a reciprocal relationship, I will offer participants English language tutoring, focusing particularly on terms related to nature and gardening. My research will culminate in a thesis examining the role of 'interior landscapes' in shaping relationships with a new inhabited environment, an area of cultural anthropology largely understudied. This investigation seeks to benefit the Karen people and the community at large by encouraging the continuation of traditions, creating a sense of 'rootedness' and preserving ethnobotanical knowledge. I approach this research with the belief that practices of remembrance are often the strongest means of combating forces of oppression.

Access to Primary Care Services in Athens

Smitha Ganeshan, Foundation Fellow
Dr. Monica Gaughan, Health Policy & Management, College of Public Health

In Athens-Clarke County, 20% of the population is uninsured and 38% of the population receives Medicaid assistance. This 58% of the population faces severe financial and structural barriers in accessing primary care services. Most of the uninsured and Medicaid patients are seen in Athens Regional Medical Center's and Mercy Health Center's emergency departments, where the cost of care is mostly uncompensated and approximately three times higher than it would be in a primary care setting. Additionally, poor longitudinal care for chronic diseases results in repeated preventable hospitalizations. A thorough literature review was conducted to develop a policy proposal to make Athens-Clarke County more competitive for federal money and assistance through the Patient Protection and Affordable Care Act. After evaluating various policy alternatives based on a cost-benefit analysis, a proposal that calls for Athens to apply for a Health Professional Shortage Area (HPSA) designation was chosen. This designation will ultimately enhance Athens-Clarke County's applications for having a Federally Qualified Health Center (FQHC) and improve low-income patients' access to primary care services in Athens. An integrated health system that provides adequate access to primary care services for low-income patients in Athens-Clarke County would improve community health, reduce health disparities, and reduce health costs.

Abstracts

The Militarization of U.S. Intelligence?
Alexis Garcia, CURO Honors Scholar
Dr. Loch Johnson, International Affairs, School of Public & International Affairs

In his 2012 Defense Strategy Rollout, President Barack Obama declared, "the tide of war is receding." Yet, the U.S. is still spending one-third more on the military than the Cold War peak, and the United States is estimated to have almost 1,000 military bases abroad. It appears as if chief executives believe that the post-9/11 world is more dangerous than ever, brimming with existential threats. As Admiral Stansfield Turner remarks in *Burn Before Reading*, military officials "simply cannot overcome their conviction that the intelligence needed on the battlefield must always have number-one priority" (256). Considering that a large amount of the information the president uses to make foreign policy decisions comes directly from these intelligence leaders, it may be that the information these leaders have provided to the president is greatly influenced by their military backgrounds, which may in turn fuel the nation's concerns over defense issues rather than economic or political issues. In order to test this hypothesis, I will examine the occupational backgrounds of the past directors of the sixteen intelligence communities, as well as the Director of National Intelligence. The methodology of this study will be to use archival records to determine who has led these agencies. Based on this data, the study will contrast the extent to which military or civilian leaders have led the intelligence community. I predict that the project will reveal that a significant number of the nation's intelligence leaders have had military rather than diplomatic backgrounds. Thus, these findings should provide important insights that might help us understand America's large spending on defense.

Teacher Attrition: Possible Policy Solutions
Eilidh Geddes, Foundation Fellow, Avery Wiens
Dr. Sylvia Hutchinson, Language & Literacy Education, College of Education

Teacher attrition is a major problem facing the United States' education system. Almost half of all new teachers will exit the profession within their first five years. Estimates of the costs of continually replacing teachers run in the billions of dollars, and attrition has major implications for the quality of the teaching workforce, as teachers make their largest gains in their teaching ability in the first couple of years. Major solutions to the problem of teacher attrition in the literature include comprehensive induction, salary increases, improvement of pre-service training programs, and changes in working conditions. If a policy of comprehensive induction includes support and mentoring for new primary school teachers, as well as collaboration with the community and departments of education, then primary school teacher attrition rates will decrease. This paper will evaluate these policy alternatives in terms of the cost of implementing the program, the cost savings of the program, the reduction in the attrition rate, and the increase in the quality of the teaching workforce.

The Role of Cysteine Residues in the Function of Ras Converting Enzyme
Nisha George, CURO Summer Fellow
Dr. Walter Schmidt, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Rce1p is a protease that is involved in the post-translational modification of Ras. Because of the well-recognized involvement of Ras in cancer biology, Rce1p, a Ras modifier, is considered an anticancer target. Despite its biomedical importance, Rce1p enzymology remains uncertain. Contrary to

the claim that Rce1p is a cysteine protease, recent investigations have demonstrated that Rce1p lacking all of its native cysteine residues remains functional in vivo. These investigations were performed using yeast Rce1p and a natural substrate, the **a**-factor mating pheromone. Notably, cysteine-less Rce1p is inactive in vitro against a synthetic **a**-factor-based substrate that is significantly shorter than the natural in vivo substrate. This study tests the hypothesis that cysteine residues are not involved in the Rce1p catalytic activity but are instead involved in substrate recognition by Rce1p in a manner that is influenced by substrate length. The ubiquitin fusion technique was used to create shortened **a**-factor substrates in vivo. We used quantitative mating tests to evaluate and quantify the ability of several Rce1p cysteine mutants, including cysteine-less Rce1p, to recognize these shortened substrates, named Ub-P2 and Ub-M, and yield mature **a**-factor. The tests reveal that the substrate recognition of cysteine-less Rce1p is comparable to that of wildtype Rce1p for the Ub-P2 substrate, while its selectivity is severely diminished to approximately ten percent of wildtype in the context of the Ub-M substrate. The results support the hypothesis that cysteine residues are involved in recognition of short substrates by Rce1p and clearly not involved in the catalytic mechanism of Rce1p.

Testing Algorithms to Predict Onset of Cerebral Malaria in Murine Model

Mina Ghobrial
Dr. Julie Moore, Infectious Diseases, College of Veterinary Medicine

Malaria is an infectious disease caused by the parasite genus *Plasmodium,* which kills approximately 2.7 million people each year. 20-50% of all malaria cases develop into cerebral malaria (CM), but much of its pathology is not clearly understood. *Plasmodium berghei* ANKA induces CM in mice. Behavioral and neurological symptoms of mice experiencing CM are similar to those seen in humans. However, incidences of experimental CM are variable. In some experiments, nearly 100% of mice develop CM, yet in others, only 50% develop CM. Lack of understanding which and when infected mice will develop CM contributes to a weak understanding of the relationship between early pathological changes of CM and the resulting outcome. In our experiments, approximately 4-8 mice are infected with *P. berghei* ANKA and evaluated daily for symptoms suggesting the likelihood that they will develop CM. On days 4-7 post-infection, the mice were subjected to a battery of behavioral and neurological tests. Each test produced a numerical score that was inserted into a published algorithm designed to predict the chance that a mouse will develop CM. While the experiments are still underway, it appears that the published algorithm does not universally apply to all experimental conditions and mouse strains. However, assessment of an alternate predictive algorithm is being investigated. Creating an effective and reliable algorithm has a plethora of benefits. For example, it can predict CM development in its early stages and the corresponding approximate time of death. Composed of simple tests and inexpensive materials, the protocol for this algorithm can be reproduced easily. This could be helpful to future research concerning CM in murine models.

Stability Analysis of the Inhibitor Resistant Phenotype of AJP50 in Biomass Fermentations

Debashis Ghose, Sr., CURO Summer Fellow
Dr. Joy Peterson, Microbiology, Franklin College of Arts & Sciences

The United States' dependence on foreign oil and a desire to protect the environment have increased demand for alternative fuels. Lignocellulosic biomass can be fermented into fuel ethanol by a biocatalytic organism, such as *Saccharomyces cerevisiae*. Adapting *S. cerevisiae* to the harsh conditions found in biomass

fermentations would increase production. Strain XR122N was adapted by continuous pine fermentation to yield strain AJP50. AJP50 was able to grow and produce ethanol more rapidly than XR122N in pine wood fermentations. To determine if AJP50 retained its inhibitor resistant phenotype, the strain was cultured on YPD media. Growth curves were created to compare the growth of the newly cultured cells to the freezer-stock AJP50. Approximately 62% of the freshly cultured cells maintained the same level of resistance as freezer-stock; at other times they reverted to the parent or an intermediately resistant phenotype, indicating the resistant phenotype is not completely stable. AJP50 cells were grown on YPD plates with a mixture of 13 major inhibitors. Single colonies were subcultured onto fresh plates containing media with all 13 inhibitory compounds. Single colonies from this plate were then grown in liquid YPD with all 13 inhibitors. The cells in the flask were compared to the AJP50 freezer stock. Those that performed similarly were made into freezer stocks to be used in future pine wood fermentations. Developing culture techniques that will allow AJP50 to retain its phenotype would aid in study of the strain's genetics, and allow for the creation of strains with advanced fermentation capabilities.

Drilling for the Future: Domestic Oil Production and Meeting America's Energy Needs

Sophie Giberga, Foundation Fellow, John Henry Thompson
Dr. Rob McDowell, Public Administration & Policy, School of Public & International Affairs

Since the oil industry boomed in the 1930s, oil has provided the United States with a consistent and reliable fuel source while allowing it to prosper and establish a high quality of life. Oil is a rich natural resource that the United States is fortunate to have in abundance. Unfortunately, environmental fears blind us to the benefits of this resource that cannot be matched in any other fuel source. The federal government has imposed strict regulations on drilling that limit the areas in which drilling is allowed and rarely allow new permits to be administered, creating an uncertain business environment for oil companies. As a result, the government forgoes $803 billion in economic growth, $6 billion in tax revenue, 690,000 jobs and billions of barrels of domestically produced oil. After a thorough literature review of studies conducted by industry experts and a cost benefit analysis, this study proposes easing certain regulations on domestic oil production. Easing regulations would mean opening up the areas currently closed to drilling on the Pacific and Atlantic coasts, in the Gulf of Mexico, and on the Alaskan coast, increasing the rate of permitting, allowing further production of shale gas, and permitting the Keystone XL Pipeline. Several studies have compared the current path of oil production with that of the possible path if this policy were to be enacted, and all have shown tremendous economic benefits. Oil is simply a natural resource that the United States logically should take full advantage of in order to continue to prosper.

The Role of Sensory Systems in *Drosophila* Courtship across Populations

Erin Giglio, CURO Summer Fellow, CURO Scholar Graduation Distinction
Dr. Kelly Dyer, Genetics, Franklin College of Arts & Sciences

All species of *Drosophila* use distinctive courtship patterns to choose among potential mates. The purpose of this project is to examine the sensory systems used in courtship behavior by two closely-related *Drosophila* species. *D. recens* and *D. subquinaria* are two species which do not mate with one another in the wild but whose geographic ranges partially overlap. It is possible that they avoid intercrossing by using different sensory systems during courtship, such as wing-based

song, pheromonal smells, or visual displays. To test which of these hypotheses was correct, I performed a series of individual crosses to identify the emphasis on each sensory system within each species. I studied flies from *D. recens* and two populations of *D. subquinaria*—one population living alongside *D. recens*, and one population that does not overlap with *D. recens*. I studied the courtship behavior of flies from each population through observation of mating pairs. Four sensory system losses were assessed through surgical removal of wings, antennae, aristae, and through painting over of eyes. Finally, I looked at the sex-based differentiation of these categories by surveying the differences between courtship success with different combinations of intact or altered males with intact or altered females. This measured the importance of these systems on courtship success. I found that olfactory signaling was important to females and that wing status and vision were important to males in almost all populations. I also identified a shift from gustatory to olfactory signaling in males from the sympatric *D. subquinaria* population.

The Uses and Effects of Music in the Conflict in Northern Ireland

Audrey Glasgow, CURO Scholar Graduation Distinction
Dr. Jean Kidula, Ethnomusicology, Hugh Hodgson School of Music

For centuries, music has been and remains an integral part of Northern Irish culture. Music is used as an expression of celebration or mourning, as a means of remembrance or protest, and in a variety of cultural functions. Another defining aspect of modern culture in Northern Ireland is the traditional and continuing conflict between Catholics and Protestants. This conflict colors the culture, the politics, and everyday life in Northern Ireland. This thesis seeks to explain the role music, a visceral and emotional force, plays in this conflict in Northern Ireland. The work is based on ethnographic research including interviews and participant-observation in Northern Ireland, as well as independent historical and musical research. This research informs insights into the culture and music and provides a broad knowledge base on the background of Northern Irish music and the religious and cultural conflict. It is hypothesized that the Northern Irish music related to the conflict will serve specific purposes based on the performers' intentions and the effects on members of the group to which it belongs and the effect on the opposing cultural group. The messages, origins, material associated with them, and locations and situations in which they are performed will likely influence the analyses of songs. These analyses of the songs attempt to determine culture non-specific definitions of the roles of music in conflict. This analysis of the Northern Irish use of music in conflict may be applicable to other cultures in which music plays an important role in conflict.

Genetic Manipulation of *Caldicellulosiruptor bescii* for Biomass Utilization

Philip Grayeski, Foundation Fellow
Dr. Janet Westpheling, Genetics, Franklin College of Arts & Sciences

Caldicellulosiruptor bescii is a thermophilic anaerobic Gram-positive bacterium that grows optimally at 75°C and is capable of using untreated lignocellulosic biomass for growth. Its substrate range includes xylan, crystalline cellulose, hardwoods, grasses, populus, and switchgrass making it a model system for the study of biomass conversion to biofuels and bioproducts. Our lab recently developed a method for DNA transformation for *C. bescii*. We are using genetics as a tool to investigate its ability to use complex substrates as well as to engineer it to make products of interest. My role in this project has been to improve existing transformation methods and to generate deletions of genes predicted to be involved in plant cell wall deconstruction. We have shown that higher transformation

efficiencies are obtained by altering medium components, lowering phosphate concentrations, removing sodium sulfide, and using a pre-culture grown to an O.D. of 0.08. We also constructed a plasmid to introduce an extra copy of the cellulose A (CelA) gene, an enzyme important in crystalline cellulose degradation with a His-tag to facilitate protein purification. We have constructed gene deletions on non-replicating plasmids and introduced them into the chromosome by marker replacement. A deletion in a cluster of genes predicted to be important for pectin degradation results in a strain that shows significant growth defect on grasses. We will use constructed deletions to identify genes important for biomass deconstruction. Methods for transformation and marker replacement will be presented.

Management of Marine Debris in the U.S.: A Survey of Options and Database for Decision-Makers

Jenna Grygier
Dr. Jenna Jambeck, Biological & Agricultural Engineering, College of Agriculture & Environmental Sciences

Solid waste (e.g., garbage, trash, litter) that accumulates in the world's waters and shorelines of waterways is known as marine debris. Marine debris is a type of pollution in which land- or sea-based activities discharge waste into the ocean and its shorelines. Debris exists throughout every depth of the ocean and can be found even in the most remote areas. Stormwater runoff, rivers, streams, etc. help transport marine debris onto the land. Marine debris represents a complex problem in which aesthetic, environmental, human and animal health, and safety factors are of concern. The purpose of this research was to investigate and document current waste management programs of various marine debris projects (beach cleanups, etc.) and partnerships in the US. The result is a dataset that can act as a resource for decision makers for land based or open ocean marine debris projects. The dataset and information will be housed on the Southeast Atlantic Marine Debris Initiative website. Individuals can access this database as a guide for implementing original marine debris waste management projects; data summaries will provide information such as the percentage of marine debris projects that recycled, landfilled, or practiced waste-to-energy methods, including the location, description, contact information, sponsorship information, etc. for each project. This research encourages the development of innovative, potential debris management methods such as gasification and pyrolysis. This research encompasses many fields of study: engineering, environmental science, alternative energy, ecology and chemistry, which all work together to explore the challenging problem of marine debris.

Description and Measurement of Response to Osmotic Stress in *Toxoplasma gondii*

Daniel Guidot
Dr. Silvia Moreno, Cellular Biology, Franklin College of Arts & Sciences

Toxoplasma gondii is an Apicomplexan parasite that infects any nucleated cell and causes significant morbidity in immunocompromised patients and unborn fetuses. It is a great model parasite because, unlike other Apicomplexans, it is highly amenable to genetic modification. *T. gondii* can infect a wide host range because of robust homeostatic mechanisms, including homeostatic osmoregulation. However, methods are needed to evaluate osmoregulatory mechanisms in *T. gondii*. We observed *T. gondii* parasites of the RH strain using Differential Interference Microscopy videos as they responded to osmotic stresses and observed how these cells react in morphology and size. We additionally observed that cells scatter light in direct correlation to changes in cell size and morphology during hyposmotic stress. Using this approach, we developed a technique to

show an osmoregulatory defect of a *T. gondii* mutant strain lacking the vacuolar proton pyrophosphatase (TgVP1), an enzyme important for osmotic regulation in plants. We observed a 60% increase in swelling in these mutants compared to parental cells in identical osmotic stress, demonstrating decreased homeostatic osmoregulation. This result shows this technique to be a sensitive and robust method to measure osmoregulatory capacity. TgVP1 localizes to the Plant-Like Vacuole (PLV), an organelle whose function is not fully understood but is so named because it possesses many membrane proteins, like TgVP1, that are found in plant vacuoles. We performed Immunofluorescence Assays on fixed cells at time intervals after exposure to hyposmotic stress and found significant PLV rearrangment. Cells showed apparent PLV fission or possibly the creation of new PLVs in response to stress.

A Piece of the Puzzle: Why People Wear Peace Signs Today

Natalya Haas
Dr. Katalin Medvedev, Textile, Merchandising & Interiors, College of Family & Consumer Sciences

According to the anthropological symbolic theory, dress represents "the relationship of the individual to the cultural system" (Hamilton & Hamilton 141-2). Therefore, wearing the peace sign represents the values and beliefs an individual wants to convey to society. And many people wear peace signs today for the same reasons they did when it first became popular during the Vietnam War – to protest a war that continues against their wishes. To arrive at this conclusion, I researched a number of academic journals, books, and popular sources discussing the peace sign and why its symbolism continues to be so relevant. I discovered that the recent reemergence of the peace sign is linked to the increase in violence-related events around the world and reveals people's desire for these conflicts to end. Designers such as Tory Burch (in 2007) and Moschino (in 2010 and 2011, possibly in support of the withdrawal of more U.S. troops) featured peace signs in their collections in the midst of the Iraq War. The increasing number of celebrities that promote peace-related issues has also led more people to wear peace signs. My research concluded that the peace sign conveys the attitude of many people toward present political conflicts around the world and expresses their desire for such conflicts to be resolved without violence.

Limb Morphology and Sequence Divergence in the *fgf* Genes of *Anolis* Lizards

Tyler Haeffs, CURO Scholar Graduation Distinction
Dr. Douglas Menke, Genetics, Franklin College of Arts & Sciences

Fibroblast Growth Factors (FGFs) constitute a large family of secreted signaling proteins that are involved in many vital processes in the vertebrate body. In particular, the well-conserved *fgf8*, *fgf10*, and *fgf19* genes encode proteins that tightly regulate limb growth during embryonic development. However, currently it is not known whether changes in the expression levels or activities of these proteins contribute to the evolution of different limb morphologies among species. In order to better understand this connection, sequence divergence for *fgf* genes of interest was compared between closely related species of long and short-limbed *Anolis* lizards, a group of species that possesses a unique combination of repeated adaptive radiations and convergent evolution of similar limb morphologies. Isolation of the *fgf* genes was carried out on cDNA samples of two different *Anolis* species, and sequence analysis was then performed on the isolated fragments to identify divergences in *fgf* gene sequence between the two species. The amino acid sequences of the encoded *fgf* proteins were observed to be nearly identical between the

different *Anolis* species. Because of this sequence similarity, I speculate that protein divergence in these *fgf*s is unlikely to contribute to the dramatic difference in limb size observed between these species. Future work could examine the expression of these genes to determine whether differences in expression correlate with changes in morphology.

Digital Analysis of Feline Bone Marrow Fat Content

Hannah Hanley
Dr. Elizabeth Howerth, Pathology, College of Veterinary Medicine

Diagnosis of malnutrition in animals at postmortem can be difficult and in forensic cases requires objective criteria for legal purposes. Currently, chemical analysis of bone marrow fat is one objective standard for assessing nutritional status. However, alternative methods for quantifying bone marrow fat that do not rely on chemical analysis, such as quantitative microscopic analysis, are needed when fresh marrow is not available. The null hypothesis of this study is that bone marrow fat content determined by chemical analysis differs from fat content determined by microscopic digital imaging. To test this, both femurs were collected from 18 cats submitted to the Athens Veterinary Diagnostic Laboratory for necropsy. One was submitted for analysis of percentage marrow fat using a chemical extraction method. The other was fixed in formalin and hematoxylin, and eosin stained microscopic sections of marrow from head and mid-shaft regions were analyzed for percentage fat via microscopic digital imaging using Adobe Photoshop. Results of the two methods were compared; findings were also compared to body condition scores. Results from the two types of analyses were similar, but the marrow fat percentage from the mid-shaft region as determined by microscopic imaging more closely matched the chemical analysis. The majority of cats had less than 60% femoral fat content, which is less than normal, based on other domestic species. However, this generalization cannot be made in cats as low fat content did not necessarily correspond to a poor body condition score.

Relationship Between Left Uncinate Fasciculus White Matter Integrity and Verbal Memory

Alexander Hansen
Dr. Jennifer McDowell, Psychology, Franklin College of Arts & Sciences

Processes of higher cognition, such as memory, ostensibly rely on the integrity of anatomical connections in order to function efficiently. Magnetic resonance imaging (MRI) is used to analyze the anatomy of the brain and can elucidate the connectivity of brain regions. Diffusion weighted imaging is an extension of MRI that measures the diffusion of water in tissues. In areas of dense myelination, diffusion parallels the length of the axons. To characterize directional diffusion along myelinated axons, software is used to calculate fractional anisotropy (FA) values, a measure of white matter integrity. Based on FA, white matter fibers can be tracked and rendered graphically, revealing the degree of connectivity between regions of the brain. In this study, we assessed the relationship between the degree of connectivity in the left uncinate fasciculus (UF), a fiber tract said to be involved with verbal memory and verbal memory performance. Diffusion weighted images (encoded in 30 diffusion gradient directions) for 20 participants (ages 8-11) were obtained using a GE 3T MRI scanner. Verbal memory was measured using the California Verbal Learning Test—Children's Version (CVLT-C). Fibers of the left UF were tracked using ExploreDTI software. Preliminary results indicate that the average FA values of the left UF are correlated with CVLT-C scores. The purpose of this study is to characterize the relationship between FA of the left UF and verbal memory performance. If a relationship

is found, it may suggest that proper development of this fiber tract is important for efficient memory processing.

Race Relations in Brazil Between 1890 and 1920

Benjamin Harris
Dr. Susan Quinlan, Romance Languages, Franklin College of Arts & Sciences

Brazil, the second-to-last country in the Americas to abolish slavery, sees itself as an extensive racial democracy. And at surface level, Brazil projects racial harmony. But analyzing the social constructions present in Brazilian society reveals that this democracy is a fallacy. This work dissects several historical, sociological, and literary texts that clearly demonstrate the precarious relationship between the Brazilian racial hierarchy: those of European, Indigenous, and African descent. In each work, the primacy of whiteness dominates through the subtle characterization of Europeans, while developing stereotypes that adversely affect the African, bi-racial, and indigenous populations. This work analyzes these representations in texts post-abolition until the end of the Old Republic in 1920. Through the historical and literary texts, it is possible to clearly see the steps that Brazil took in its formation and understanding of racial relations into the modern day. Ultimately, Brazilian society during that time utilized white-washing as a tool to eliminate racial hierarchy. Interpreting the literary texts further, it is then possible to understand the multiple, marginalized perspectives and project them as a reflection of Brazilian societal goals.

Analysis of the Legal Needs of Primary Care Physicians

Osama Hashmi, CURO Summer Fellow
Dr. Monica Gaughan, Health Policy & Management, College of Public Health

The American Medical Association has recently defined various legal issues physicians face, ranging from patient confidentiality to malpractice management. As the Patient Protection and Affordable Care Act goes into effect between now and 2014, physicians will need to navigate an even more complex and legal environment. During this time period, policy researchers around the United States will be asked to evaluate alternatives to improve and reform the current policy problems in healthcare delivery. As the legal issues physicians face become a more prominent aspect of physician life and primary care recruitment, this research will be crucial in promoting a better system of healthcare for the United States. My contribution to the study was to employ various policy analysis tools to analyze the legal needs of primary care physicians, and to provide a comprehensive evaluation of the physician payment system, as well as the networks which create our current system. This research also involved travelling to Washington, D.C to work on-site with various groups analyzing the current national health care policy environment, especially as it relates to the primary care labor force.

Residential Electricity Consumption and Affordability of Efficiency and Clean Energy Upgrades

Heather Hatzenbuhler
Dr. Andrew Carswell, Housing & Consumer Economics, College of Family & Consumer Sciences

Fossil fuel-generated electricity is artificially competitive in the energy market, which is excluding competition from renewable energy technologies such as wind, solar, geothermal, and tidal. In the U.S., coal is also the largest

source of fuel for electricity generation, generating more power than natural gas and oil combined.**1** Coal is the largest contributor to greenhouse gas emissions in the country, and it releases dangerous pollutants such as arsenic, lead, and mercury into the air and water supply. This pollution has significant environmental and human health costs that are not accounted for in the market price of coal-generated power. These economic conditions make household investments in clean energy and efficiency technologies cost-prohibitive for the average consumer. Residential efficiency and clean energy (RECE) upgrades that could reduce energy costs and improve environmental conditions are not feasible for most homeowners. Similarly, most consumers are uninformed about the origin of electricity and ways to conserve power. Through a review of government data, academic studies, and existing policies and outcomes, I have crafted a policy that addresses the barriers to RECE investment in Georgia. It includes a package of tax incentives, financing options, and education to be implemented as a pilot program in Athens-Clarke County.

1 U.S. Energy Information Administration, U.S. Coal Supply and Demand, 2009 Review, April 2010. Retrieved at <http://www.eia.doe.gov/cneaf/coal/page/special/overview.html>

Legal Approaches to Addressing Water Pollution Risks Related to "Fracking" in the Marcellus Shale Region

Heather Hatzenbuhler
Dr. Terence J. Centner, Agricultural & Applied Economics, College of Agriculture & Environmental Sciences

Hydraulic fracturing, or "fracking," is an industrial process used to harvest fossil fuel reserves that lie deep underground. By digging wells and injecting them with large quantities of water mixed with specially selected chemicals at high pressures, the rocks that store these natural resources are cracked open, allowing their contents to flow to the surface. This process has led to a significant increase in the economic reserves of natural gas in the United States. The once unreachable shale gas is now being piped out by the ton, and natural gas prices in all sectors—commercial, residential, and industrial—are at 5-year lows. However, there is growing concern about evidence of negative environmental impacts from fracking. The potential for water contamination, land destruction, air pollution, and geologic disruption at every step in the process has brought the safety of this extraction method into question. States such as New York, New Jersey, Maryland, and North Carolina have banned fracking until further research and review of environmental and human health impacts are completed. This paper looks specifically at the impacts that these processes have on local water supplies and seeks to identify the best legislative or regulatory approach to mitigating these risks in the Marcellus shale region. Existing state and federal laws, government data, and peer-reviewed academic studies and articles will provide a base of information for analysis and development of policy alternatives. Criterion such as ecological impacts, political feasibility, and operational practicality will establish framework for evaluation and ultimate policy recommendations.

An Affect Control Theory Analysis of Islam and Christianity

Anna Beth Havenar, CURO Honors Scholar, CURO Summer Fellow
Dr. Dawn Robinson, Sociology, Franklin College of Arts & Sciences

While western scholars have studied the languages and cultures of many groups, Arabic linguistic culture remains sorely under-investigated. My research employs semantic analysis of Arabic and English words to examine the role of religion in shaping linguistic culture. Utilizing Affect Control

Theory, I will analyze the way that sentiments affect other sentiments (impression change). I focus on three universal dimensions of sentiments: evaluation (good to bad), potency (powerful to weak) and activity (lively to quiet). These generalized sentiments are widely shared across a culture, and it is our agreement upon them that allows us to communicate with others. My data is derived from surveys of 500 native English speakers and 470 native Arabic speakers currently residing in North Carolina. These data, collected during the summer of 2010, serve as a pilot study for a new international data collection project to begin in the summer of 2012. I expect to see an emphasis of potency over evaluation in Arabic speakers, perhaps due to the deeply rooted Islamic ideals of shame and honor. Once our data is collected in the U.S. and the Middle East, we can use it in simulation programs to predict the outcome of social actions in various situations. By comparing our results with previous and current English ACT studies, we will be able to explore key differences in American and Arab cultures. This research is funded by the U.S. Naval Academy and will hopefully aid soldiers in their interactions with Arabic-speaking civilians during conflict in the Middle East.

Rastafari: Continuity, Discontinuity, and Present Identity

Paul Havenstein
Dr. Reinaldo Román, History, Franklin College of Arts & Sciences

Despite its global reach**,** Rastafarianism is one of the most misunderstood religions in the world. Since the 1970s, Rastafarians have grown from a Jamaican peasant cult to a worldwide socio-political, religious, and cultural phenomenon. This transformation has not gone unnoticed, but as UCLA historian Robert A. Hill points out, "there is an urgent need to reintegrate the study of Rastafarians into the dynamic flow of popular social movement in a manner that is sensitive to both the complex aspects of continuity and discontinuity in the overall historical process." My thesis is aimed at addressing this need with a study of select Rastafarians groups from around the globe. The object is to determine second-generation communities' engagement in the Jamaican tradition, and to what extent they represent distinct social movements rooted in new dynamics. The paper will cover the continuities and discontinuities as the religion spread and ask the question of who today is an authentic Rastafari? My work focuses much on the current state of Rastas in Washington, DC and includes in-depth personal interviews with Gary Himelfarb, partly responsible for bringing reggae music to DC, and Dr. Jake Homiak, a leading expert on Rastafari and curator of the "Discovering Rastafari!" exhibit at the Smithsonian. My thesis will clarify how and why the religion transformed from a deviant and sometimes violent cult in Jamaica to a worldwide proclamation of universal love and respect.

Recycling and End-Use Industries in Georgia

Jennifer Hegarty,
Laura Hegarty
Dr. Anne Marie Zimeri, Environmental Health Sciences, College of Public Health

A study by the Georgia Recycling Commission found that 16 Georgia paper mills use recycled content, with 9 of the mills relying exclusively on recycled fiber. Because Georgia does not recycle enough paper to meet production demands, Georgia's end-use industries are currently buying recycled material from other states, yet they still often do not have enough supplies to keep up with production demands. The GRC study also found that Georgians throw away an estimated 1.9 million tons of paper a year -- paper that could be recycled and purchased by end use markets within the state. Although many Georgians recycle, many more do not because they deem it too inconvenient and

expensive, and perceive a lack of facilities available to accommodate such recycling. The lack of paper recycling within the state of Georgia causes market failure by way of externalities through pollution and through the limitations it places on the development of Georgia's end-use industries. This policy proposes that Georgia implement a state-wide recycling initiative to increase the volume of paper recycled with the goal of enhancing and increasing the end-use industry within the state, which would in turn stimulate the state's economy. With use of a thorough literature review as well as a cost benefit analysis, alternatives to the status quo will be evaluated on the basis of efficiency, economic growth, political acceptability, the interest of future generations, and improvability. The proposed policy will be the one that stands up best to this evaluation.

Increasing Breastfeeding Rates in Athens-Clarke County

Anisha Hegde, Foundation Fellow
Dr. Alex Kojo Anderson, Foods & Nutrition, College of Family & Consumer Sciences

Breastfeeding is linked to improved child and maternal health. Low breastfeeding rates contribute to poor health outcomes and an estimated $3.6 billion in superfluous costs to health care providers and patients--markers compounded by the unavailability of breastfeeding support to those in the bottommost social strata. Breastfeeding rates in the U.S. are lower than those in most of the developed world; only 14.8 percent of U.S. mothers breastfeed exclusively for six months. Georgia's breastfeeding rates are amongst the lowest in the U.S. (only 10 percent of Georgian mothers exclusively breastfeed at 6 months). These rates are even lower in Athens-Clarke County, which currently offers sparse and costly or underfunded breastfeeding services through St. Mary's, Athens Regional, and the Supplemental Nutrition Program for Women Infants and Children. To better this status quo, a policy recommendation to establish a breastfeeding peer counseling program in the two hospitals was constructed through literature reviews, cost-benefit analysis, and interviews with healthcare personnel. By implementing a counseling program in hospitals, targeted at but not limited to mothers living 185 percent or more below the poverty line, an efficient partnership and mutually beneficial relationship amongst patients, hospitals, and Athens-area organizations would be fostered. The program would potentially increase the number of women breastfeeding for one year by 15 percent--likely an underestimate because it is based on numbers from Hartford Hospital, which serves a larger minority, disadvantaged population than do Athens-area hospitals. According to Healthy People Goals, an increase of 15 percent is enough to improve the health of a community by making infants less susceptible to illnesses such as gastroenteritis and reducing risks for diseases such as breast cancer and heart conditions in mothers.

Dietary Resource Partitioning of the Southern Flying Squirrel (*Glaucomys volans*)

Katherine Helmick
Dr. Gary Barrett, Odum School of Ecology

Understanding feeding habits of the Southern flying squirrel, *Glaucomys volans*, is limited to few scientific studies. We investigated dietary preference of *Glaucomys volans* by computing daily rate of ingested energy, and ranking food preference. Five food resources were provided to 10 individual flying squirrels (6 male, 4 female) for 5 consecutive days. Individuals were contained in separate experimental tanks. Each *G. volans* was provided with fruits of *Cornus florida*; acorns of *Quercus alba*, *Q. nigra*, and *Q. velutina*; and nuts of *Carya glabra*. *G. volans* ingested the most grams of *Q. alba*, averaging 53.6 Kcal·day-1 of *Q. alba*. The average rate of ingestion for the Southern flying squirrel was 109.8 Kcal per day; thus *Q. alba,* constituted 49% of their

daily diet. *Q. velutina* , *Q. nigra*, and *C. glabra* respectively were ranked next in dietary preference. Southern flying squirrels consumed 16.9 Kcal·day-1 of *Q. velutina*, 15.5 Kcal·day-1 of *Q. nigra*, and 10.7 Kcal·day-1 of *C. glabra*. There was no clear overall pattern in food preference concerning these 3 foods: preferences varied among individuals. The least preferred food of *G. volans* was fruits of *C. florida*, averaging 9.1 Kcal·day-1. These findings suggest that the survivorship of *G. volans* relates to a diversity of food resource availability.

Developing Kinetic Genotype-Phenotype Correlations for Missense Point Mutations in Human Protein O-Linked Mannose β-1,2 N-Acetylglucosaminyltransferase (POMGnT1)

Sam Hempel, CURO Honors Scholar
Dr. Lance Wells, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Human protein O-linked mannose beta-1,2 N-acetylglucosaminyltransferase, also known by its acronym POMGnT1, is a type II transmembrane glycosyltransferase found in the Golgi apparatus. POMGnT1 is one protein that plays a role in the larger pathway of O-mannosylation that is found in many different types of human tissues, most prominently in skeletal muscle, brain tissue, and the eyes. We are developing genotype-phenotype correlations for missense mutations in POMGnT1, a glycosyltransferase found in the mammalian O-mannosylation pathway. Several cases of POMGnT1 mutation in humans have been previously documented; however, the direct relationship between genetic mutation, molecular phenotype, and clinical presentation has yet to be well characterized. Muscle-Eye-Brain disease (MEB, OMIM 253280) is the predominant phenotype of genetic mutations in the POMGnT1 gene, yet the phenotypic variation that has been observed in POMGnT1 enzymatic mutants is too diverse to categorize under one "umbrella" – there is a growing need for more specific genotype-phenotype correlations in POMGnT1 mutants. One exemplary missense mutation (R311G) presents as classical MEB: severe muscular dystrophy, mental retardation, and unique eye deformations. However, a different missense mutation in the enzyme (D556N) results in limb-girdle muscular dystrophy (LGMD, OMIM 613517), a mild form of congenital muscular dystrophy with *normal* brain function. Developing these correlations is the ultimate aim of the project. Towards this goal, we are using genetic techniques such as site-directed mutagenesis to develop several mutants of interest, and eventually we intend to measure enzyme stability and kinetics to characterize the ultimate molecular phenotype of each mutant.

Protein-Glycosaminoglycan Interaction Studies Using Surface Plasmon Resonance (SPR)

Alexander Herzog
Dr. Carl Bergmann, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Glycoaminoglycans (GAGs) are complex polysaccharides that display unique binding and regulatory properties in the presence of specific proteins. These molecules are prevalent in the extracellular matrix, and they are sometimes referred to as mucopolysaccharides due to their viscous, mucous nature. Three of the sulfur containing GAGs, heparin, heparan sulfate, and chondroitin sulfate (CSA), contain structural similarities that significantly impact the physiological regulation of an organism. In this study, we biotinylated heparin, heparan sulfate and chondroitin sulfate through the reducing terminus of the GAG chain, immobilized the GAG on a sensor chip, and studied the interaction with GAG-binding proteins, SDF-1 and Slit3, through Surface Plasmon Resonance (SPR). SDF-1, an *a*-chemokine that binds to G-protein-coupled CXCR4, acts as an inhibitory

factor that deters emigration of premature B cells out of bone marrow and interacts with heparin. The other GAG-binding protein, Slit3, is a large, secreted repulsive axon guidance molecule. Recent genetic studies reveal that Slit3 is dispensable for neural development, but required for non-neuron related developmental processes (where heparan sulfate is absolutely required for Slit-Robo signaling). Analysis of affinity constants for GAG-SDF-1 and GAG-Slit3 attachment, as well as their non-covalent interacting partners, is expected to provide a reasonable initiation for therapeutic intervention.

Effects of Platelet-Derived Growth Factor Receptor Inhibition on Feline Injection-Site Sarcoma Radiosensitivity

Joseph Hill,
Brittany Feldhaeusser
Dr. Michelle Turek, Anatomy & Radiology, College of Veterinary Medicine

Platelet derived growth factor receptor (PDGFR) is a protein kinase that has been shown to be important in feline injection-site sarcoma (ISS) cell survival and signal transduction. Masitinib is a tyrosine kinase inhibitor that specifically targets multiple growth factor receptors including PDGFR. The objective of this study is to evaluate the effects of masitinib on the radiosensitivity of ISS cells. Clonogenic assays were performed using ISS cell lines to determine the effects of masitinib and radiation on cell survival. ISS cells were irradiated with a single radiation exposure (0, 3, 6, 9, 12 Gray). Survival was defined as the ability of the cells to maintain clonogenic capacity and to form colonies. After irradiation, cells were plated for colony formation and colonies consisting of ≥ 50 cells were counted following incubation. Clonogenic experiments were carried out in triplicate in two ISS cell lines, KH and Hamilton. For each cell line, radiation experiments were performed in control cells (without masitinib) and in cells exposed to 6 μM masitinib for 72 hours before irradiation. Results indicate that masitinib and radiation decrease cell survival in a radiation-dose-dependent fashion. Masitinib at the dose and duration of exposure used here does not appear to alter the radiosensitivity of ISS cells. Based on these data, masitinib may not have a role in the management of ISS in combination with a single dose of radiation. Additional in vitro investigation may be warranted to explore the temporal effects of combination therapy.

Prisons for Profit: A New Approach to the Private Prison Model in the State of Georgia

Dev Iyer
Dr. Jody Clay-Warner, Sociology, Franklin College of Arts & Sciences

The issue of prison reform and recidivism rates is a growing issue in the state of Georgia. Currently, Georgia operates the fifth-largest prison system in the nation, a majority of which is privately owned. At a cost of $1 billion a year, the private prison system has absolutely no incentive to reduce the rate of incarceration and recidivism. Despite the growing problems of the Georgia prison system, little research has been conducted to accurately frame the issue and offer an alternative. This paper analyzes the business model of privately run prisons and isolates the factors that are inputs and outputs to the process. After an extensive cost/benefit and impact analysis review of various policy alternatives, a specific tool will be offered for identifying low-risk inmates as well as qualifications for community-based treatment programs. This researcher will also recommend a new business model for private prisons that eliminates the role of politics and corporate influence on profitability. These policy alternatives will ensure a more stable prison system that will be focused on helping rather than profiting.

Abstracts

The Belle and the Behemoth: *Uncle Tom's Cabin* and the Southern White Woman

Ransom Jackson, CURO Summer Fellow
Dr. John Inscoe, History, Franklin College of Arts & Sciences

In a paternalistic society like the antebellum South, women were not expected to have an opinion on politics or slavery. Yet *Uncle Tom's Cabin* blazed through the South, influencing many women to make a final decision on slavery one way or the other. Some saw it as a retched institution ruled by rich white men and governing over women with a brutal fist. Others remained loyal to its ideas of class, race, and downright way of life that the South had become accustomed to. This paper discusses the ways in which Harriet Beecher Stowe's characters influenced southern white slaveholding women. It will show that women indeed had an opinion about the "peculiar institution." Finally, it will show that their anger developed into attempts at changing the world they belonged to. The influence of *Uncle Tom's Cabin* on southern white women is crucial in showing that they had a voice and did attempt to make a change.

Development of a Genetic Screen for Vitamin B12 Uptake Mutants in Mycobacteria

Elena James, CURO Honors Scholar, CURO Summer Fellow
Dr. Russell Karls, Infectious Diseases, College of Veterinary Medicine

Tuberculosis, a disease in humans resulting from infection by *Mycobacterium tuberculosis*, kills approximately 1.4 million people annually. Vitamin B12 is a cofactor in various *M. tuberculosis* metabolic enzymes. Utilization of vitamin B12 by this pathogen when added to culture suggests possible uptake of B12 from humans. Thus, *M. tuberculosis* vitamin B12 uptake proteins may serve as useful targets for antitubercular drug development. My project is to develop a genetic screen for vitamin B12 transport mutants in mycobacteria. I created a plasmid in which an antibiotic-resistance gene is under the control of a B12 riboswitch, an RNA structure that blocks gene translation upon binding of vitamin B12. This plasmid, which can replicate in mycobacteria and *E. coli*, has DNA elements in this order: a transcription terminator, the promoter and B12 riboswitch from the *M. tuberculosis metE* gene, and a promoterless apramycin-resistance gene. This plasmid was introduced into a related species *Mycobacterium smegmatis*. We hypothesized that this plasmid would confer resistance to apramycin in mycobacteria only when vitamin B12 is absent from the culture medium. However, expression of the apramycin resistance gene is too high even when vitamin B12 is added. To reduce expression, the same DNA elements have now been cloned into a plasmid which is maintained in mycobacteria at a single copy per cell. If this plasmid confers tight vitamin B12 control of apramycin resistance in *M. smegmatis*, the next step will be to perform transposon mutagenesis in this strain and select for mutants defective in vitamin B12 uptake.

Noah Webster's *American Spelling Book* as a Product of Colonial American Culture and Economics

Emily Jessup
Dr. Bill Kretzschmar, English, Franklin College of Arts & Sciences

Noah Webster's *The American Spelling Book* was the most popular book of its time in America. The "blue-backed speller" shaped American education and culture, selling over 15 million copies in the years following its first publication in 1783. The success of Webster's speller is apparent; however, why he experienced such success is the question that still seeks an answer. The *American Spelling Book* could not have been produced successfully if Webster had not carefully considered different aspects of the text's

physical publication and distribution, as well as how to distribute the text, once published, to those who would make up the intended audience. Webster's efforts to distribute his speller in the more urban and densely populated northern states ensured his speller would have greater and more immediate success as opposed to the southern states where the population was less dense and more diffuse. In addition, the culture of American education was ripe for change as nationalism swept the country in the post-Revolutionary War years. It was an opportune time for the introduction of a speller like Webster's, full of religious and nationalistic sentiments. An examination of the location and economics of the printing industry, the population diversity of the possible audiences for Webster's book, and the changing culture and educational structure of the late-eighteenth century demonstrates that Webster's success, while in part due to the educational material the speller introduced, was in larger part owing to his considered and calculated distribution.

Examining Genetic Diversity in Peruvian Samples of *Plasmodium falciparum*

Rachel Johnson, CURO Honors Scholar
Dr. David Peterson, Infectious Diseases, College of Veterinary Medicine

Plasmodium falciparum is a causative agent of Malaria, a disease which affects hundreds of millions of people annually. VAR2CSA is a member of the Duffy-Binding like (DBL) protein superfamily which has been shown to mediate binding of the parasite to a unique host receptor. VAR2CSA is a highly polymorphic protein, a target of the immune response, and understanding the level of diversity in this protein is important. Previously, we cloned the DBL3x domain of VAR2CSA from Kenyan blood samples into plasmids, which were then sequenced. In collaboration with the CDC, we now seek to characterize diversity among *P. falciparum* from Peruvian samples. DBL3x was first amplified from sixteen different Peruvian samples, followed by ligation into a plasmid vector. After transformation of the PCR product into chemically competent *E.coli* cells, positive colonies were indentified and sequenced using conventional sequencing methods. The DBL3x region was confirmed and located in the sequencing results. At the conclusion of this project, we plan to have DBL3x-positive sequences from at least ten of the original sixteen samples. All sequencing results will be analyzed in order to characterize the diversity among the Peruvian *Plasmodium falciparum* population. Furthermore, we seek to quantify the genetic differences between the Peruvian samples and the previously studied Kenyan samples. By studying the genetic variation of the DBL3x domain, we seek to come to a deeper understanding of the mechanisms by which parasites, specifically *Plasmodium falciparum*, bind to their host and cause infection.

Inflammatory Cell Markers' Gene Expression in Mouse Model of Placental Malaria

Mathew Joseph
Dr. Julie Moore, Infectious Diseases, College of Veterinary Medicine

One of the foremost health issues in the developing world during pregnancy is malaria, with nearly half the world's population living in high-risk areas. *Plasmodium falciparum*, transmitted by the Anopheles mosquito, is the deadliest protozoan parasite which causes malaria in humans. We have recently initiated studies on malaria during pregnancy using *Plasmodium chabaudi* AS (a rodent plasmodium species) to infect C57BL/6J (B6) and A/J mice as model platforms for understanding the immunopathogenesis of malaria during pregnancy. On day zero of pregnancy, mice are infected with *P. Chabaudi* inoculum. Throughout gestation, secreted cytokine and chemokine proteins are assayed by ELISA. Tissues from mice spleens and fetoplacental units are homogenized and RNA is isolated. cDNA is made from the RNA and real-time

PCR is performed to assess levels of T cell markers with specific primers. The data obtained show that *CD3e (*T cell marker), *Hprt2* (B cell marker*), Mgcl2* (macrophage marker), and *Klrd1* (natural killer cell marker) are upregulated in infected pregnant A/J and B6 mice relative to their respective uninfected counterparts. This implies that *Plasmodium chabaudi* induces a local placental inflammatory response as does human malaria during pregnancy. Our research analyzes the mechanistic basis for malaria-induced compromise of pregnancy, especially mid-gestation, when high parasitic density is coincidental with pregnancy loss in our model. Continued study promises to reveal common and critical mechanisms that contribute universally to malaria-induced compromise of pregnancy.

Private Equity in Brazil

Samuel Kinsman
Dr. Jeff Netter, Banking & Finance, Terry College of Business

This research broadly analyzes the development of financial markets in Brazil with specific focus on private equity (PE) investment. Private equity's well-known absence of public company regulation and reporting requirements have appealed to investors because of the opportunities for increased returns. Likewise, PE investments in private companies can connect investors with high growth companies not listed on public exchanges. Recent trends in PE fundraising suggest investors in developed economies are allocating more capital to emerging economies to take advantage of higher growth opportunities. This research project seeks to document important trends in Brazilian PE deal financing structure including equity vs. debt ratios, minority stake vs. majority stake investments, and foreign vs. domestic capital sources. Controlling for other relevant factors, regression tests will link the data to key macroeconomic indicators to create a model for prediction of PE investment trends in Brazil. Initial research suggests declining macroeconomic indicators such as declining inflation rates have impacted the structure of PE investment by lowering the cost of debt for investments. Research findings may explain why PE investors are turning to Brazil and how monitoring readily available macroeconomic indicators can be a useful tool to quickly estimate the expected growth of Brazilian PE funds from both domestic and foreign investors.

A New Approach to Histomoniasis: Data Mining and Targeted Drug Sensitivity

Michael Klodnicki
Dr. Robert Beckstead, Poultry Science, College of Agriculture & Environmental Sciences

Histomonas meleagridis, the causative agent of blackhead disease in gallinaceous birds, is an anaerobic parasite that lacks mitochondria. Few treatment options exist for *Histomonas* infection, the most effective of which is banned in the United States and Europe for application in livestock bound for human consumption. Previous studies on closely related organisms have revealed certain details of their anaerobic, hydrogenosomal-centered metabolism, providing a clear target for drug treatment that is distinct from the host's metabolism. Using a multi-disciplinary approach, we have generated a cDNA library of the *H. meleagridis* genome and an annotated contiguous DNA sequence database to study virulence factors and specific metabolic components. Additionally, we examined the potential and efficacy of novel methods of controlling infection by targeting the hydrogenosome. In this study, we demonstrate through a series of sensitivity assays that application of variable concentrations of zinc in solution significantly inhibits in vitro growth by acting on the hydrogenosome. Furthermore, we evaluated potential methods of zinc delivery in vivo to begin treatment development for livestock application.

Abstracts

International Boundary Settlement and Domestic Conflict
Cody Knapp, CURO Honors Scholar
Dr. Andrew Owsiak, International Affairs, School of Public & International Affairs

After they settle their borders, do states intensify repressive practices and experience a higher rate of intrastate violence? Previous studies have shown that states with unsettled borders experience higher levels of militarization, centralization, and social cohesion relative to states with settled borders. Theoretical arguments, however, are indeterminate regarding the precise effect that international border settlement has on domestic uses of violence. In this study, I will test the expectations of these divergent theoretical arguments. I will identify complete border settlement as a potential influence on the occurrence of intrastate conflict and confirm an empirical relationship between the two variables. I test the arguments using data on international border settlement and civil conflict during the period 1816-1997. Through its findings, this study will demonstrate the previously unrecognized implications of the positive action of state border settlement for a state's susceptibility to civil conflict. If complete border settlement renders a state more or less likely to experience internal unrest in subsequent years, then recognizing this correlation would enable policy makers to take steps to address the potential influences associated with this action.

Individual Environmental Awareness and Urban Water Conservation in Kunming, China
Logan Krusac, Foundation Fellow
Dr. Larry Nackerud, School of Social Work

Although the majority of water use in China occurs in the countryside, the responsibility for water conservation flows from the urban population centers outward. This research employs surveys of urban residents in Kunming, Yunnan Province in order to illustrate China's urban centers' growing impact on water conservation. This study determines what contributes to effective environmental awareness and analyzes the relationship between an individual's awareness and his or her in-home water conservation methods. The results show that first-hand environmental awareness is significantly more effective in encouraging conservation than is traditional environmental education. In addition, the survey reveals a pervasive lack of awareness in urban Kunming, with only 4 percent and 13 percent of respondents correctly identifying the price and source of their water, respectively. Only 59 percent of those surveyed believed they could have any influence in solving China's water crisis—a statistic that must change in order to promote greater urban water conservation.

Exploring Medical Practice Through Chekhov's Literature
Elina Kumykova, CURO Scholar Graduation Distinction
Dr. Elena Krasnostchekova, Germanic & Slavic Studies, Franklin College of Arts & Sciences

The relationship between literature and medicine has been reflected in many great literary texts. Doctors often become involved in the stories of their patients' lives. Literature, too, has the human being for its object. Many physician-writers explored their feelings and concerns about individual characters or patients in their writing. Medical practice has served as a rich source of material for some well-known authors, such as Arthur Conan Doyle, Anton Chekhov, and William Carlos Williams. The first purpose of this reseach is to examine the influence of Anton Chekhov's medical practice on his writing. The study will describe Chekhov's medical practice and his daily routine of seeing patients. Using biographical materials, the period of 1892-1897 when Chekhov served as the "Country Doctor" in Melikhovo will receive specific

attention. At this stage, the study seeks to understand why some existing research depreciated Chekhov's medical practice. The second purpose is to describe insights into the art of medicine offered by Chekhov's writing and particularly by "Ionych," "A Case History," "Ward Six," and "Uncle Vanya." At this stage, the study will describe Chekhov's insights into the doctor-patient relationship, specific diseases, medical ethics, etc. As a result, I seek to understand why Chekhov called medicine his "lawful wife" and literature his "mistress."

The Moderating Role of Romantic Relationship Satisfaction on the Relation Between Parenting Stress and Maternal Hostility

Kelsey Kuperman,
Suzanne Meller
Dr. Anne Shaffer, Psychology, Franklin College of Arts & Sciences

Prior research has established an association between high parenting stress and parental hostility (i.e, harsh, punitive discipline; Sturge-Apple et al., 2010). Additionally, research has identified romantic relationship satisfaction as a moderator on the relation between self-reported parenting stress and mothers' report of parenting hostility (Deater-Deckard & Scarr, 1998); however, few studies have examined observed parent hostility toward children during middle childhood.
The current study examines the moderating role of mothers' romantic relationship satisfaction on the association between maternal stress and observed maternal hostility in a diverse community sample of 39 mother-child dyads (child ages 8-11). Dyads completed a conflict discussion task, attempting to reach compromise on a topic of current conflict (e.g., homework, fights with siblings, chores). These discussions were video recorded and later coded for maternal hostility with adequate interrater reliability. Indicators of hostility included rejecting statements, cynicism, and mothers' disregard for her child. Mothers completed the Parenting Stress Index (PSI-SF; Abidin, 1995), and indicated their current level of relationship satisfaction on a seven-point scale. We hypothesized that under high parental stress, high romantic relationship satisfaction will buffer maternal hostility and low relationship satisfaction will exacerbate levels of maternal hostility. The overall model that examined relationship satisfaction as a moderator was significant (F (3, 35) = 6.27, $p < .01$; $R2 = .59$). The main effects of parenting stress ($t = 3.24$, $p < .05$) and relationship satisfaction ($t = 2.15$, $p < .05$) on hostility were significant, as well as their interaction ($t = -3.21$, $p < .05$), indicating moderation.

Development of a Vector to Delete the β-lactamase Gene from Mycobacteria

SaiSudeepti Kuppa
Dr. Russell Karls, Infectious Diseases, College of Veterinary Medicine

Mycobacterium tuberculosis causes tuberculosis, a disease which in 2010 claimed 1.4 million lives, out of which 350,000 individuals were also infected with the HIV virus. This bacterium is resistant to β-lactam antibiotics, such as penicillin, because it carries the *blaC* gene encoding a β-lactamase which cleaves and inactivates this class of drugs. The live vaccine strain *Mycobacterium bovis* BCG carries an identical *bla*C gene and can cause disease in people infected with HIV. A live vaccine that is sensitive to penicillin is considered to be safer as this drug could be used to treat people who develop disease from the vaccine. Therefore, the goal of this project is to delete the *blaC* gene from *M. bovis* BCG and from *M. tuberculosis*. A former student in the lab created plasmid pAR17, which is designed to facilitate deletion of any targeted mycobacterial gene by specialized transduction. Upon testing the system by targeting a specific gene, it was discovered that pAR17 may be too large after combining with transducing mycobacteriophage DNA to be stably

packaged into phage capsids. To address this, plasmids pSK1-pSK4 were generated by deletion of nonessential regions from pAR17. Plasmids pSK3 and pSK4 are currently being modified to target deletion of *blaC*. The resulting plasmids will be useful in evaluating if smaller plasmid size addresses the in vitro packaging problem observed with pAR17 and in mutating the *blaC* gene in pathogenic mycobacteria.

Construction of a vapB Deletion Mutation in a Swine Isolate of *Rhodococcus equi*

Monica LaGatta
Dr. Mary Hondalus, Infectious Diseases, College of Veterinary Medicine

Rhodococcus equi, a Gram-positive facultative intracellular bacterium, is a pathogen of foals, pigs and immunocompromised people. In foals and humans, *R. equi* typically causes bronchopneumonia, whereas in swine the predominant clinical presentation is lymphadenitis. The ability of virulent strains of *R. equi* to replicate intracellularly in host macrophages and establish chronic disease is dependent on the possession of a large extrachromosomal virulence plasmid. This virulence plasmid contains a pathogenicity island (PAI), which encodes a novel family of genes called virulence associated proteins (*vaps*). The PAI of foal plasmids possess *vapA*, a gene encoding a surface-expressed lipoprotein shown to be essential for intracellular replication and establishment of a chronic infection in a murine model system. In contrast to equine isolates of *R. equi*, swine isolates are vastly unstudied. It is known however, that the virulence plasmid of swine isolates has significant homology to that of foal isolates. Nonetheless, swine plasmids do not contain *vapA*, rather they possess the related gene, *vapB*, which shares ~80% sequence identity at the amino acid level. VapA and VapB are hypothesized to be functionally equivalent proteins in their respective hosts. To determine if *vapB*, like *vapA*, is essential for intracellular replication, we used a two-step allelic exchange strategy employing a single crossover intermediate and counter-selection to construct a marked deletion mutant of *vapB*. The requirement of *vapB* for intramacrophage growth will be assessed by comparison of the intracellular growth phenotypes of the *vapB* mutant and wild type *R. equi* using standard in vitro macrophage infection assays.

Development of Nut-Cracking Skills in Wild Bearded Capuchin Monkeys (*Sapajus libidinosus*)

Kellie Laity, CURO Summer Fellow
Dr. Dorothy Fragaszy, Psychology, Franklin College of Arts & Sciences

Bearded capuchin monkeys crack nuts using large stones as hammers. This behavior is thought to be traditional. Juvenile capuchins (birth to four years old) are not directly taught by adults how to crack nuts, nor can they crack nuts open themselves, yet they spend a lot of their time for several years participating in percussive activities. We set out to study adult and peer facilitation on nut-cracking behaviors of juvenile capuchins. Our hypothesis is that nut-cracking activities of group members support young monkeys' practice with nuts and stones during the years that they cannot open nuts themselves. We collected data in Piauí, Brazil on a group of nineteen capuchin monkeys. Behavioral data were collected for eleven juvenile monkeys (4 – 54 months) by observing consecutive focal juveniles and their neighbors for 20 minute periods over eight weeks (393 focal samples). Manipulation of nuts increased with age ($R2 = 0.78$, $N = 11$, $p < 0.001$). Within-subject analyses are in progress; currently we know that for five individuals, manipulation of nuts increases when two or more other individuals in the group are concurrently manipulating nuts. These data support the hypothesis that juveniles' practice related to nut-cracking is promoted by group activities. Further analyses will be conducted to find if a) specific individuals' activities, b)

hearing (but not seeing) others crack, and/or c) encountering artifacts of previous cracking (nut shells, stones) promote percussive activity by juveniles. Research supported by the National Geographic Society and CURO.

Information as Narrative Poison or Poultice in Ergodic Literature

Connor Land
Dr. Richard Menke, English, Franklin College of Arts & Sciences

This presentation focuses on the impact of information on the narratives of ergodic texts, conventionally known as videogames. In *The Storyteller,* Walter Benjamin explains that information and narrative differ in that "the value of information does not survive the moment in which it was new. It lives only at that moment," whereas "a story is different. It does not expend itself. It preserves and concentrates its strength and is capable of releasing it even after a long time." Most modern games contain both information and narrative. Games will often stream statistics on a heads-up-display in the game while simultaneously involving the player in narrative events. From a background in narrative studies, I will try and discover if information has as dire an effect on games' narrative content as Benjamin would contend. Using reading materials from previous research, supplemented with those in the areas of information and narrative minimalism, I will discuss how storytelling in gaming is either hurt or helped by information. The bourgeoning field of ludic studies contains a few notable works in its own right, but it lacks papers addressing one narrative issue with a perspicacious focus. Thus this presentation seeks to start a more nuanced dialogue about the games we take for granted as toys and link videogame studies with other narrative media such as film, photography, and the novel.

Immortalization of Primary Swine Respiratory Epithelial Cells

Christopher Lee
Dr. Ralph Tripp, Infectious Diseases, College of Veterinary Medicine

Influenza A viruses pose a significant risk to human health due to their continuous evolution and zoonotic potential. Swine are thought to be a mixing vessel for generation of reassortant influenza viruses because they can be infected with both avian and human influenza A viruses, and unlike humans, readily support replication of avian influenza viruses. To advance disease intervention strategies, there is a critical need to better understand the innate antiviral responses of swine respiratory epithelial cells to avian influenza virus infection. Unfortunately, few if any immortalized swine bronchoalveolar epithelial cell lines exist which are need to facilitate these studies. In this study, we harvested and isolated primary normal swine lung epithelial (NSBE) cells from a healthy pig and attempted to immortalize the cells using various procedures. After isolating the NSBE cells from all other components of the lungs, the cells were infected them with a lentivirus construct carrying a simian virus 40 (SV40) T antigen to induce immortalization by suppressing the p53 tumor suppressor protein. The results suggest that this method of cell transformation has the capability to immortalize NSBE cells, and we have isolated several colonies of immortalized cells. Prospective studies with these transformed NSBE cells will be performed to identify pathways and mechanisms that influenza virus uses to infect and undergo reassortment with other influenza A viruses in host swine respiratory epithelial cells.

Abstracts

The Contribution of Environmental Contamination with *Salmonella* to Human Illnesses in Georgia

Michelle Lee
Dr. John Maurer, Population Health, College of Veterinary Medicine

In the US, *Salmonella* causes 1.4 million illnesses each year. While most cases in the past have been attributed to the consumption of fecally-contaminated food, *Salmonella* infections by non-food borne strains, more specifically environmental strains, have been increasing in humans. The environment has a potential role in the lifecycle of *Salmonella*, and consequently, it can affect its geographic distribution. By investigating the distribution of *Salmonella enterica* serovars in the environment, specifically from surface waters and wildlife species inhabiting the collection sites, as well as collecting relevant geographical information, we can determine the ecological interactions that contribute to salmonellosis in humans. Monthly surface water samples from the Little River (three sites) and the North Oconee River (three sites) were collected and sampled for *Salmonella*. A total of 13 *S. enterica* serovars among 197 *Salmonella* isolates were compared genetically using pulsed- field gel electrophoresis (PFGE). Several *Salmonella* strains from this study were identical to human isolates in the CDC PulseNet database. PFGE patterns of *S. Braenderup*, type Br2, and *S. Muenchen* isolates were identical to human isolates in the CDC Pulsenet database, providing further support for the contribution of environmental contamination to human illness.

Characterization of the Tneap Complex in the CRISPR-Cas Viral Defense System of Prokaryotes

Marianne Ligon, CURO Honors Scholar, Ramsey Scholar, CURO Summer Fellow
Dr. Michael Terns and Dr. Rebecca Terns, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

The CRISPR-Cas (**C**lustered, **R**egularly-**I**nterspaced, **S**hort **P**alindromic **R**epeats and **C**RISPR-**as**sociated genes) system is a recently discovered defense system present in approximately 40% of bacteria and 90% of archaea. Small RNAs and ribonucleoprotein (RNP) complexes provide the basis of this adaptive, genetically-heritable immune system that protects prokaryotes against viruses, plasmids, and other genome invaders. There is a wide variety of both conserved and subtype-specific *Cas* genes, but little is known about the biochemical activity of the majority of these gene products and RNP complexes. In this study, the *Tneap* subtype proteins are investigated in how they function within the CRISPR-Cas system to confer immunity. Recombinant proteins and synthetic RNAs cloned from the thermophilic archaea *Pyrococcus furiosus* and *Thermococcus kodakaerensis* are used to acertain structural and functional components of the *Tneap* RNP consisting of three proteins, Cst1, Cst2, and Cas5t, and a crRNA (CRISPR RNA). I show that these proteins form an RNP complex with crRNAs of varying length and are able to bind ssDNA and dsDNA in a crRNA- and homology-dependent many.. Further work involving a predicted nuclease, Cas3, must be done to determine the function of the *Tneap* RNP complex. The *Tneap* RNP requires few genes to assemble, and therefore may be useful in applying the CRISPR-Cas system to a variety of industries, including the biofuels, biotechnology, dairy, and gene therapy industries.

Abstracts

Stimulation Current Does Not Influence NIRS Measured Metabolic Rate

Hillary Liken
Dr. Kevin McCully, Kinesiology, College of Education

Near infrared spectroscopy (NIRS) has been used to evaluate skeletal muscle oxygen levels and metabolic rates. This study tested the effect of different electrical stimulation current levels on NIRS measured metabolic rate. Healthy subjects (six females, ages 23-32) were tested. A dual channel NIRS device (Oxymon, Artinis) was used with separation distances between 3.0-4.5 cm, placed over the medial gastrocnemius or vastus lateralis. Surface electrical stimulation produced muscle activation. Each subject was stimulated for three two-minute stimulation periods at 4 Hz with randomized current levels. Between levels, a 10 second ischemic period was used to measure metabolic rate. A five-minute duration ischemic cuff with reactive hyperemia was used to calibrate NIRS signals. Oxygen saturation during stimulation was not significantly different ($F(2,15) = 0.02$, $p = 0.980$) between current levels (70.1 + 8.6 %, 69.7 + 13.4 %, 71.0 + 9.4 % low, med, high current) and was similar to resting oxygen saturation (65.9 + 11.9 %). Metabolic rate was not significantly different ($F(2,15) = 0.085$, $p = 0.919$) between current levels (1120%, 1118%, 1118% of resting metabolic rate for low, med, high current). Longer separation distances gave results similar to those reported for shorter separation distances. Small differences in current levels at or above 50 mA did not influence muscle oxygen saturation or metabolic rate following electrical stimulation. Separation distance also did not influence these measurements. This suggests that electrical stimulation is a feasible method of activating skeletal muscle for NIRS-based measurements of muscle metabolism.

The Relationship Between Macular Pigment and Neural Compensation

John Liu
Dr. Lisa Renzi, Psychology, Franklin College of Arts & Sciences

Macular pigment is a collection of dietary carotenoids within the central retina, which is known for its ability to improve visual function by filtering short-wave light. MP optical density varies widely in the population; consequently, some individuals filter the majority of the short-wave light that enters the eye from a combination of MP and a yellowing lens, while others with little to no MP and a relatively clear lens must transduce the majority of short-wave light that enters the eye. Despite these differences in the amount of short-wave (blue) light that reaches the retina and, consequently, the amount of visual improvement that can be achieved as a result of having MP in the retina, past research suggests that the majority of individuals are similarly sensitive to short-wave light. The purpose of this project is to determine whether or not compensation within the central nervous system is responsible for the relatively uniform short-wave sensitivity seen in the population, despite differences in the amount of light that reaches the retina.

Phospholipase Expression in Cocaine-Addicted Rats

Casey Love
Dr. Brian Cummings, Pharmaceutical & Biomedical Sciences, College of Pharmacy

Recent studies from our laboratory show that exposure of rats to cocaine, followed by withdrawal and re-exposure significantly alters the expression of several different types of phospholipids in multiple brain areas. Alterations in select phospholipids correlated to increased sensitization to cocaine and increased intensities of initial responses to cocaine re-exposure. The expression of several types of phospholipids in the brain is

controlled by a class of enzymes called phospholipase A2 (PLA2). We hypothesize that the exposure of rats to cocaine will alter PLA2 expression. Four of the many isoforms were chosen for this experiment: iPLA2 beta, iPLA2 gamma, NTE, and GAPDH was used for the control. Expression was assessed using reverse transcriptase and quantatative-polymerase chain reactions (RT- and qPCR, respectively), which also assess the level of mRNA expression. We found that NTE, iPLA2 beta, and iPLA2 gamma were expressed in control brains at different levels depending on the brain region. NTE seemed to be expressed more in the Cerebellum with the other three areas(ventral striatum, dorsal striatum, and Hippocampus) close behind. NTE was expressed the least in the Hippocampus of the control brains which is where the phosphatidylcholine levels were found to be increased after cocaine exposure, withdrawal, and re-exposure. iPLA2 beta had the highest levels of all three enzymes in all four regions of the brain with the hippocampus second to last in its levels. Furthermore, the difference in expression of these enzymes were little to none for the hippocampus area and the cerebellum had a greater expression of all of the enzymes in the cocaine addicted brain tissues verses the saline treated tissues out of four different tissues of the same brain area.

The Molecular Dynamics of Atomic Sticking Coefficients

Katie Manrodt, CURO Honors Scholar, CURO Summer Fellow
Dr. Steven Lewis, Physics & Astronomy, Franklin College of Arts & Sciences

Interstellar dust has been shown to be a common mechanism for the formation of molecular hydrogen; however, the "sticking probability" of atomic hydrogen impinging on these surfaces remains somewhat controversial. This project aims to provide continuity between two conflicting past studies. In 1998, Takahashi, Masuda and Nagaoka preformed a computational study of the sticking probability of atomic hydrogen. A study done in 2002 (Al-Halabi, Van Dishoeck, and Croes) cited experimental data showing an error in the previous study: the sticking probability was actually much lower than the 1998 study determined. This project utilized the code from the 1998 computational study, modified it according to the methods cited in the 2002 paper, with the intention of comparing results to that of the 2002 study. Computations were carried out using the classical molecular dynamics technique. Our corrected sticking probability is higher than the one found in the 2002 and 1998 paper, which was not expected. We are currently looking into what could have this affect, exploring the properties the slab of water ice used, etc. Ultimately, this project will be used as the starting point for more simulational studies of the sticking probability of carbon and nitrogen.

Lost Chapters in the *Wind-Up Bird Chronicle*: A Translation and Commentary

Kieran Maynard
Dr. Masaki Mori, Comparative Literature, Franklin College of Arts & Sciences

Murakami Haruki is the most translated living Japanese author. His longest novel, *Nejimakidori kuronikuru* (1994, 1995), has been translated into English as *The Wind-Up Bird Chronicle* (1997) by Jay Rubin, who cut about 61 of 1,379 pages, including three chapters (Book 2 Chapters 15, 18, and part of 17; and Book 3 Chapter 26). Other sections were rearranged or altered. I will translate the omitted sections, compare my reading of the altered sections and the entire work to Rubin's, and comment on the effects of translation practice on the English language text as a literary work. My theory of translation practice is drawn primarily from Venuti (1998) who proposes a "foreignizing" translation practice to counter 'domestication' that occurs when a work is translated between

cultural contexts. Translation "approximates" the experience of a literary work in another language; the "source text" and the translation have a "performative relation" (Venuti 1998). I have completed translating Chapters 15 and 17, and part of 18, and have noted that the most frequently omitted character is one Rubin claims detracts from the book. I expect the omitted chapters will invite a new interpretation of the novel, despite Rubin's claim, "We are *not* talking about huge textual differences between the Japanese original and the English translation" (Rubin 2002); that choice of translation practice will be found to have artistic and ethical implications; and that a better understanding of these choices as they relate to Japanese and to literature will benefit translation studies as a whole.

War, Peace, and Seduction: An Analysis of Tolstoy's Hélène Kuragin as a Symbol of Female Sexuality

Melissa McDaniel
Dr. Charles Byrd, Germanic & Slavic Studies, Franklin College of Arts & Sciences

In the tradition of the Greek epics *The Iliad* and *The Odyssey*, Leo Tolstoy's masterpiece *War and Peace* observes and re-interprets the impact of fate (what Tolstoy calls "history") on personalities, from the high and virtuous to the low and deceitful. Hélène Kuragin of *War and Peace*, a deviation of Helen of Troy, is too often dismissed as little more than a typical femme fatale by critics who gloss over her connection to the epic Helen. An analysis of her treatment as symbol of violent sexuality in terms of the epic tradition reveals what the vilification of Hélène means about the relationship of men and women in a world of both war and peace. While others have analyzed the depiction of women in Tolstoy's literature, they have more often focused on the novel *Anna Karenina* or Natasha Rostov, the girlish heroine of *War and Peace*, and Hélène's place within the events of the novel is often overlooked. This investigation will compare the vilified Hélène to victimized Helen of Troy in order to point out how Tolstoy prevents Hélène from receiving the same sympathy as her precursor. In the few scenes in which she appears, Tolstoy focuses on Hélène's body as an instrument of war, revealing the novel's underlying connection between wealth, murder, and unnatural sexual promiscuity. Through Natasha, Tolstoy illustrates his admiration for the fortitude and fertility of Russia, but Hélène displays fear of the corrupting violence of female sexuality.

Public Art in Athens-Clarke County

Brittany McGrue, CURO Honors Scholar
Dr. Marilyn Wolf-Ragatz, Lamar Dodd School of Art

Public art refers to any piece of artwork meant to be displayed and enjoyed in the public sphere, and pertains to all the arts. Public art can be funded through government channels, private funding, or philanthropic efforts. Important benefits of a public art program include those of education, aesthetics, job stimulation and economic development. Although Athens-Clarke County is considered an arts community with some established public art, the community was interested in structuring a program that would build upon that foundation. In order to explore the possibilities of creating a program, the mayor's office appointed a task force in April of 2010 and charged the group with researching public art programs, identifying possible funding sources and inventorying established public art. A 1% for art ordinance was recommended by the task force and approved by the Mayor and County Commissioners late in 2010. The Athens Cultural Affairs Commission, a 9-member commission of community volunteers that works in tandem with the government, was created in March of 2011. My research has involved participating in meetings of both the task force and the ACAC, facilitating communication, researching the topic of public art, and most importantly, observing the process of creating a public art program.

A final responsibility of my participation in this progression was to create the foundation and procedure for inventorying the County's present art collection. This was done using PastPerfect museum software provided by through the County's Arts and Leisure Department.

Discrepancy Between Client Expectations and Doctor Reports of the Success in Treatment of Veterinary Patients

Caitlin McManemon
Dr. Erik Hofmeister, Small Animal Medicine & Surgery, College of Veterinary Medicine

Numerous factors affect patients' expectations after a consultation with their doctors regarding various illnesses. The patients themselves, their degree of worrying, the number and types of problems and symptoms they encounter, and the previous knowledge and experience they have with their condition can all play a role. This could lead to the patient either overestimating or underestimating his or her likely chance of successful recovery. Such a disconnection could also result when patients regard other important matters, such as their animals. This experiment intends to establish whether or not an analogous disagreement exists, and then to delve into and understand the reasons behind why the dissonance may occur. The study consists of two separate surveys, one that will be given prior to the first consultation, and one that will be administered immediately following the consultation during the same visit. The surveys include the Depression-Anxiety-Stress Scale 21, the Comfort from Companion Animals Scale, and the Illness Worry Scale. By utilizing these select scales, the study aims to find a potential correlation between various degrees of depressive, anxious, and worry-related symptoms characteristic of the participants themselves, as well as their subjective assessment of their bond with their pets, which may illuminate sources affecting their future outcome appraisals. These results may uncover new ways to lessen the gap and promote more effective veterinarian-client consultations with regards to the expected outcome of the animal patients.

Effects of Helminth Infection on Local and Systemic Immunity

Lindsey Megow, CURO Summer Fellow
Dr. Kaori Sakamoto, Pathology, College of Veterinary Medicine

Bovine tuberculosis, caused by *Mycobacterium bovis*, is a serious, reportable, zoonotic problem primarily affecting bovids worldwide. Control of *M. bovis* infection requires an effective T helper (Th)1 response. On the other hand, infection by intestinal helminths, a common problem in wild bovids, triggers a Th2-skewed immune response. We therefore hypothesize that when an animal is infected with intestinal nematodes, the resulting systemic Th2-skewed environment created by the immune system down-regulates the Th1 response, decreasing the ability of the animal to fight the mycobacterial infection. We are developing a mouse model to study this effect. The mice are co-infected with the intestinal nematodes *Heligmosomoides bakerii* and *Nippostrongylus brasiliensis*, followed by intratracheal instillation with *M. bovis*, in order to mimic the conditions found in an African buffalo study by our collaborators, the Ezenwa laboratory. At specific time points after infection, tissues from the lung, intestines, and regional lymph nodes will be harvested for histopathology, flow cytometry (to determine recruited leukocyte subsets), and ex vivo cytokine production. Serum will also be collected to study the systemic cytokine responses. Preliminary results have shown an increased local pro-inflammatory cytokine response in the lungs, with increased eosinophil recruitment and perivascular cuffing. Results have also shown greater T lymphocyte recruitment to the lungs and intestines with nematode co-infection as compared to single nematode infection. Co-

infection also exhibited a suppressive effect on *H. bakerii* egg production. After optimizing the helminth co-infection, mice will be intratracheally infected with *M. bovis*.

Histological and Protein Expression Changes in Mouse Models of Early Dystroglycanopathy

Garrett Melick
Dr. Aaron Beedle, Pharmaceutical & Biomedical Sciences, College of Pharmacy

Dystroglycanopathies, characterized by progressive muscle weakness and wasting, are associated with abnormal glycosylation of alpha-dystroglycan (αDG). Fukutin is one of six proteins known to be important for αDG glycosylation (Barresi, Campbell 2006); and we have shown that knock out of the mouse fukutin gene early in skeletal muscle development (Myf5-cre/Fktn KO) elicits severe dystroglycanopathy. Here, we hypothesize that loss of dystroglycan function during skeletal muscle differentiation disrupts muscle signaling pathways to promote the severe disease phenotype. To address this research question, we studied skeletal muscle fiber type specification, which is a downstream readout of differentiation pathways, using immunofluorescent imaging of myosin heavy chain genes in knockout (K) and littermate control (LC) mice at 4 and 8 weeks of age. We then correlated myosin heavy chain expression, to indicate muscle fiber type, with disease severity. Preliminary data suggests altered fiber type distribution in KO mice that is correlated with mouse age. As expected, the iliopsoas muscle showed considerably different fiber isotype content than quadriceps muscle. Thus, fiber type specification appears altered in dystroglycanopathy mice in an age- and muscle-group-dependent manner. These data are significant because they suggest that differentiation signaling pathways are altered and may contribute to disease severity in our mouse model. Further analysis of these abnormal signaling pathways may provide targets for new therapeutic strategies.

Emotion Regulation and Childhood Depression: An Examination of Moderators

Suzanne Meller
Dr. Anne Shaffer, Psychology, Franklin College of Arts & Sciences

Emotion regulation is the ability to modify or maintain emotions in order to successfully navigate emotional experiences (Gross & Thompson, 2007). Children experiencing significant deficits in emotion regulation have an elevated risk for developing psychopathology (Zeman et al., 2002), including childhood depression (e.g., Betts et al., 2009). The majority of studies examined middle-class Caucasian samples (e.g. Silk et al., 2003), while other potential moderators (i.e. child gender, parent perceived child difficulty) have yet to be investigated in diverse samples. In order to understand whether the association between child emotion regulation and child depressive symptoms differs depending on ethnicity, child gender, family income, and parents' perceived child difficulty, we propose a series of moderation models. Participants include 64 mother-child (ages 8-11; 40.6% male;) dyads from a diverse sample (i.e. Caucasian, 40.6%; African American, 51.6%; yearly income < $20,000, 49.9%). Children's emotion regulation was assessed using the self-reported Child Emotion Management Scale (CEMS; Zeman et al., 2001) and via behavioral coding of the interaction tasks. Child depressive symptoms were assessed via the Child Depression Inventory (CDI; Kovacs, 1992). Perceived child difficulties were measured using the Parenting Stress Index subscale (PSI-SF; Abidin, 1995). Results showed that children's problems with emotion regulation were consistently associated with depressive symptoms for all examined moderators (i.e. gender, parent perceived child difficulty, ethnicity, income). The association between

emotion regulation and depressive symptoms regardless of gender, perceived difficulty, ethnicity and SES stressed the importance of children's development of adaptive emotion regulation abilities in the prevention of depressive symptoms.

Cumulative Risk and Child Psychopathology: Understanding the Role of the Parenting Relationship

Suzanne Meller,
Sophie Arkin, Isabel Cohen
Dr. Anne Shaffer, Psychology, Franklin College of Arts & Sciences

Children experiencing multiple risks throughout development have elevated likelihood of experiencing psychopathology (Flouri et al., 2009). Cumulative risk, the combined effect of several risk factors (e.g. single parenthood, low income; see Obradovic et al., in press), is a greater predictor of negative child outcomes than any single risk factor alone; thus, it is important to examine risks in combination versus isolation (e.g. Sameroff, 2006). Although children experiencing multiple risks have greater chance of experiencing psychopathology, positive parent-child interactions have potential to mitigate these negative effects (Trentacosta et al., 2008). This study expanded on literature by examining the positive relation between cumulative risk and child psychopathology in a demographically diverse sample, and predicted positive parent-child interactions would moderate (i.e., buffer) this association. 64 mother-child (8-11 years) dyads completed interaction tasks recorded for subsequent coding. Positive parent-child interactions were assessed using observed shared positive affect (e.g., mother laughed and child shared in the experience by smiling/laughing). Cumulative risk was calculated based on previous research (e.g. Grant et al., 2003), and included eight mother-reported risk factors (e.g., recent life stressors; annual income under $20,000; clinical levels of psychopathology assessed via the Symptom Check List-90-Revised; Derogatis, 1994). Child psychopathology was assessed via maternal self-report (Child Behavior Checklist; Achenbach, 1991). Cumulative risk was related to more externalizing problems in children only when there were low levels of shared positive affect between mother and child (β = -.220; t(53) = -1.793, p = .079), indicating the importance of interventions targeting the parent-child relationship in high-risk environments.

Effect of Sugar on Brain Peptides

Sarah Mitchell, CURO Honors Scholar
Dr. Silvia Giraudo, Foods & Nutrition, College of Family & Consumer Sciences

The role of sweets and palatable foods within the context of the overweight and obese can be explored by examining the effect of fructose intake on orexigenic signals and hormones, such as ghrelin. Changes in the amount of ghrelin affects satiety and hunger levels, which can cause weight gain and even lead to obesity. Previous studies indicate that fructose may cause an increase in ghrelin levels that other sugars do not. Our main objective is to see what difference there is between the effects of dextrose and fructose on ghrelin levels. We are looking at how different sugars affect ghrelin levels in rats over a twelve week period, using three groups of rats and the sugars dextrose (a mixture of sucrose and glucose) and fructose with one control group. During the study, we measured the weight fluctuations and food intake over the twelve-week period. We harvested brain tissue to determine via immunohistochemistry changes in ghrelin receptor activation. This information will lead us to more knowledge about the effects of fructose versus other sugars on brain peptides regulatories of consumatory behavior. The interactions between our diet and ghrelin might lead us to develop new strategies to prevent overeating and more effective weight management therapies to treat obesity.

Abstracts

Insecure Attachment, Low Self-Esteem, and Low Parental Warmth as Predictors of Substance Abuse

Hannah Muetzelfeld,
Grace Cha
Dr. Joshua Miller, Psychology, Franklin College of Arts & Sciences

Given the increasing rate of marijuana use and the consistently heavy alcohol abuse among college students, and the resulting societal impact (e.g., Pentz, 1999), an empirical investigation of risk factors and predictors of such abuse is imperative. Previous studies have demonstrated a relationship between marijuana and alcohol abuse and both low self-esteem (e.g., Donnelly, Young, Pearson, et al., 2008) and parental warmth (e.g., Johnson & Pandina, 1991). To expand on this existing research, the present study explores insecure romantic relationship attachment in addition to parental warmth and low self-esteem, and their potential relationship with marijuana and alcohol use. This broadens an idea used by Kassel, Wardle, and Roberts (2007), in which it was proposed that adult attachment style plays an influential role in the prevalence of drug use, in addition to self-esteem and parental variables. It is hypothesized that low self-esteem, low parental warmth, and insecure attachment styles will all account for a significant amount of variance in both alcohol and marijuana use. To examine these relationships, self-reports from 342 college students were collected. Simultaneous regression analyses revealed that the model significantly predicted substance use ($t = 2.23$, $p < .01$). In terms of the individual relationships between independent variables and substance use, only parental warmth predicted substance use ($t = -.346$, $p < .01$). Together, these three variables contributed 22.3% in shared variability.

Prospect Theory and Common Action Problems: Loss Aversion in International Riparian Treaty Compliance

Bryn Murphy, Foundation Fellow
Dr. Peter Brosius, Anthropology,
Franklin College of Arts & Sciences

This paper attempts to apply cognitive science findings on loss aversion to identify best practices for treaties governing common pool resources. Prospect theory demonstrates that decision-makers are loss-averse: decision-makers overvalue losses relative to comparable gains. Consistent with this finding, international treaties governing common pool resources should achieve greater compliance when they are structured to provide an immediate gain (commons protection treaties) than when they demand an immediate loss (public goods treaties). This paper will test this hypothesis through regression analysis on an adapted version of the Transboundary Fluvial Dispute Data set. In the interest of maintaining an interdisciplinary perspective, these findings will be analyzed in the context of anthropological literature on common action problems and riparian politics. The findings could suggest more effective structures for treaties governing international rivers specifically, and common pool resources generally.

Measuring Transformational Leadership in the NFL

Aaron Murray
Dr. Karl Kuhnert, Psychology, Franklin College of Arts & Sciences

Transformational leadership has become a popular leadership style with several distinct characteristics. In theory, transformational leaders influence followers by raising follower self-awareness, establishing a sense of purpose and vision, and influencing followers to assume lower-order goals for the long term benefit of the organization (Bass, 1985). A myriad of research also suggests that

transformational leadership leads to a variety of benefits for groups, such as creating more innovative teams, increasing behaviors that have positive contributions to team environments, and overall leading more effective teams (Keller, 1992, 2006; Piccolo & Colquitt, 2006; Podsakoff & MacKenzie, 1997; Judge & Piccolo, 2004). Although few would debate the strong influence of leadership in professional sports, research is lacking as to the measurability of such leadership characteristics among this unconventional demographic. Our study hopes to analyze the key behaviors of transformational leadership in quarterbacks from the National Football League. Specifically, we hope to construct and test a behavioral coding system to measure levels of transformational leadership among these team leaders. In order to test this, we will develop our coding system based on assessment center methodology, which research has found to be sufficiently valid (Klimosky & Strickland, 1977). Using archival data from past seasons in conjunction with game footage of starting quarterbacks, we will examine the effects of these transformational leadership behaviors on team success, as well as if situational factors play a role in the presence of such behaviors.

Gestational Diabetes Education Program
Amita Nawathe
Dr. Fazal Khan, School of Law

Gestational diabetes is one of the most common health issues that arise during pregnancy. It is currently estimated that 26 million American women have gestational diabetes. It is also estimated that one of every two to five women with gestational diabetes will develop Type II diabetes within a decade of giving birth. The rising epidemic of obesity, minority ethnic populations becoming the majority, and increasing levels of socioeconomic disparity make it more important than ever to analyze alternatives to the current system of delivering gestational diabetes care. Through a thorough literature review and cost benefit analysis, this paper proposes that Georgia implement a Gestational Diabetes Education Program (GDEP) to help curb the problem of gestational diabetes. The GDEP will be funded both federally (Medicare) and locally (Medicaid) and will incentivize the creation of more primary care residency seats in rural and underserved areas of Georgia, the education of patients and the establishment of strong relationships between healthcare providers and patients. Implementing a state-wide GDEP can help prevent spending approximately 100 billion federal tax dollars on diabetes related costs over the next decade, while also helping residents of Georgia live healthier, happier and more fulfilling lives.

Post-Katrina Recovery Processes in the Vietnamese-American Community
Khai Nguyen
Dr. Steven Holloway, Geography, Franklin College of Arts & Sciences

The paper examines the recovery process of the Vietnamese community around the Gulf Coast in the aftermath of Hurricane Katrina. It focuses on cities with large Vietnamese populations such as Biloxi, Mississippi and New Orleans, Louisiana. Its framework is based on three major factors: intra-member relationships within the Vietnamese community as well as external interactions with the African-American community, the news media portrayal of the recovery and re-building process, and broader implications for federal disaster management. In addition to academic journals, the paper relies on sources such as newspaper articles, available census data and statistics from interviews with NGOs, to evaluate federal intervention as compared to community-based assistance. This study will also attempt to track the migration trends of evacuees from the Gulf Coast to urban areas around the US which contain significant Vietnamese populations (i.e. Houston, Texas and Atlanta, Georgia).

Preliminary research finds that the federal handling of disaster aid, by not taking into account the historical background of marginalized minorities and the geographical importance of communal support, exacerbated the fragmentation of communities. The model minority myth, which overstates the speed and success of the recovery of the Vietnamese community, was reinforced by the media. This ultimately interfered with allocation of disaster aid at the expense of black Americans and caused the notable cooperation between the two communities to go largely unacknowledged. It is therefore irresponsible and counterproductive to advocate for self-reliance in disaster recovery because help does not go to the people and places that need it most.

Assembly and Subspeciation of Haptoglobin-Related Protein Containing High-Density Lipoproteins

Tuiumkan Nishanova
Dr. Stephen Hajduk, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

The purpose of this research is to define the mechanisms of High-Density Lipoprotein (HDL) subspeciation. Specifically, we are seeking to understand how the retained N-terminal signal peptide of Haptoglobin-related protein (Hpr) mediates association and distribution of Hpr amongst HDLs. We propose that HDL lipid fluidity affects the ability of signal peptides to associate with HDLs. We have addressed the first question by performing HDL-binding studies with native Hpr and recombinant Hpr that lacks the N-terminal signal peptide. To study how HDL fluidity affects the ability of apolipoproteins with retained signal peptides to associate with HDLs, we have utilized a model system in which we can modify liposome fluidities and observe how Hpr interacts with each of the liposomes. We show that the retained signal peptide of Hpr is necessary and sufficient to associate Hpr with HDLs. We also show that HDL fluidity affects HDL- association of apolipoproteins with retained signal peptides. We found that liposomes with lower fluidities have tighter binding with Hpr, while liposomes with higher fluidities have faster binding with Hpr. It is significant to understand how HDLs assemble and factors affecting this assembly process because it will help us determine the best ways to treat patients with disorders, for example cardiovascular and metabolic diseases, where the levels and or composition of their HDLs are affected.

Protein Purification, Crystallization, and Functional Annotations of Five Essential LysR-type Transcriptional Regulators in *Acinetobacter baylyi* ADP1

Melesse Nune, CURO Scholar Graduation Distinction
Dr. Cory Momany, Pharmaceutical & Biomedical Sciences, College of Pharmacy

There are over forty LysR-type transcriptional regulators (LTTRs) in *Acinetobacter baylyi* ADP1. Five of the LTTRs in *A. baylyi* are essential under defined growth conditions (Database of Essential Genes <http://tubic.tju.edu.cn/deg/>). These five essential LTTRs are ACIAD0461, ACIAD0746, ACIAD2511, ACIAD1539, and ACIAD2384. Only ACIAD2384 has homology to an LTTR with known function, MetR, which controls methionine biosynthesis in bacteria. *Acinetobacter baumannii*, a closely related organism to *A.baylyi*, is a multidrug-resistant pathogen that kills tens of thousands of hospital patients each year and is considered an emerging threat. The essential LTTRs in ADP1 are present in *A.baumannii* and thus may represent novel antibiotic targets for drug discovery in the pathogen *A.baumannii*. Studies have been initiated to better characterize these essential LTTRs. The genes have been cloned into an expression plasmid that adds a polyhistidine C-terminal purification tag for simple protein purification

from *E. coli*. Successful protein purification using metal-chelate chromatography has transitioned to crystallization studies. Bioinformatic analysis (evaluation of shared synteny and multiple sequence alignments) and functional studies (EMSAs) are being used to identify the regulated metabolic targets. The structural and functional studies done on these LTTRs will improve our understanding of microbial metabolism and transcriptional regulation and may provide avenues to develop new classes of antibiotics.

Modeling Subtelomeric Growth and the Adaptive Telomere Failure Hypothesis

Farres Obeidin, CURO Summer Fellow
Dr. David Hall, Genetics, Franklin College of Arts & Sciences

In many organisms, subtelomeric regions, the sequences near the ends of chromosomes, have a variety of features including an abundance of duplicated sequences, epigenetic silencing of genes, very high rates of evolution, and enrichment for genes involved in rapid adaptation to novel environments. These features are due in large part to a greater tolerance of subtelomeric regions to recombinational exchanges. The adaptive telomere failure hypothesis proposes that telomeres may have evolved to partially fail at a certain rate in some or all conditions to accelerate recombinational exchanges in subtelomeric regions. To determine the viability of this hypothesis, we constructed a Mathematica model to simulate evolution of individuals in environments with varying degrees of selection. This selection acts on a class of genes known as contingency genes. The model follows an organism through a set number of generations, recording the genomes of each individual and the number of contingency genes in subtelomeric regions at each time step in relation to the total number of these genes. Subsequent additions to the model allowed for increased recombination near the telomeres, an effect of telomere dysfunction, to address whether a high rate is favored in a population undergoing selection on contingency genes because of an inherently higher ability to rapidly alter gene dose. Data from these simulations will most directly examine the adaptive telomere failure hypothesis.

Truth in Labeling: Nutritional Value Under NLEA

Philip Oldham
Dr. Robert Nielsen, Housing & Consumer Economics, College of Family & Consumer Sciences

Obesity rates are climbing and the health risks associated with obesity are alarming. Providing consumers with nutritional content such as fat, sugar, and salt has become increasingly important to combat this health epidemic. Nutrition labels are the primary method by which consumers account for nutrient content. Food labeling policy, however, has not been addressed since the Nutrition Labeling and Education Act of 1990 despite the increased complexity of food over the past two decades. Research suggests that consumers find it difficult to understand current labels and that there are more effective ways to display nutrient content for consumers. To better understand consumers' ability to interpret nutrition labels, this study convened a focus group of consumers who provided feedback on the use of new tools that clarify the nutritional value of food products. I expect the results to indicate that food labels are more comprehensible when the nutrient content is displayed graphically and in color. These data have important implications for consumer policy. In understanding what consumers comprehend, policymakers can shape labeling policy to reduce the asymmetry of information between consumer and producer in the food market.

Abstracts

Development of Disability Awareness Assessment Scale

Andrea Orton,
James Ford, Kristen Whipple
Dr. Kevin McCully, Kinesiology, College of Education

Enhancing social awareness of individuals with disabilities is important among students at UGA in contributing to their education. The purpose of this study was to test version 1 of a disability awareness assessment scale. A 34-item scale was developed, and IRB approval was granted to use this scale at the beginning and end of an academic semester. The questionnaire included 16-items with a 1-5 range focused on disability awareness, and 16-items with a 1-5 range focused on drug use in sports. Participants were recruited from two freshmen First Year Odyssey seminar (FYOS) classes. The disability group consisted of freshmen students in a First Year Odyssey course on disability awareness (n = 5). The control consisted of freshmen students in a First Year Odyssey course on Drugs and Sports (n = 13). The test scores on the questions related to disability awareness were 49.0 + 5.6 pre and 51.0 + 2.7 post class for the experimental group and 40.4 + 4.2 and 41.6 + 4.8 for the control group. The disability class had higher awareness scores than the control group ($p = 0.001$). However, there were no differences between initial and final scores in either group ($p = 0.231$). The results suggest that students selected the disability course based on previous knowledge and experience with individuals with disabilities. The lack of change in the disability awareness scores in the disability group suggests that the test battery was not sensitive to change, as by self-report, the students reported significant increases in disability awareness and a high degree of satisfaction in the course. Future studies are needed to test more participants, in particular students with low scores on disability awareness prior to a disability awareness course.

Finite-Difference Time-Domain Investigations of Metamaterials

Elliot Outland, CURO Honors Scholar
Dr. William Dennis, Physics & Astronomy, Franklin College of Arts & Sciences

Metamaterials, artificially engineered materials possessing properties not normally found in nature, have a variety of applications, such as miniaturized antennas, superlenses, and cloaking devices. In order to put these novel materials to their best uses, it is necessary to understand how and why they work as they do. The finite-difference time-domain (FDTD) method is one way of achieving such understanding; by solving electromagnetic equations one time step at a time, one can gain information about the way that waves interact with the material in question for all future time-steps. Our research uses the MIT Electromagnetic Equation Program (MEEP) to perform FDTD calculations on the behavior of electromagnetic waves as they propagate through various metamaterials in comprised of nanostructures in different configurations After we specify the material and geometric parameters and run the simulation, MEEP produces an output file from which we can obtain quantitative data about the light-material interaction. By analyzing these results, we can gain a better understanding of how the nanomaterial parameters ad geometry affect the optical properties of the metamaterials; this will aid in the designing of new metamaterials with desired optical properties.

Affinity and Specificity Characterization of Fbs1 via Surface Plasmon Resonance and Glycan Array Screening

Akshita Parikh
Dr. Robert Woods, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Ubiquitin-mediated proteolysis of misfolded proteins occurs through the systematic cascade of three types of enzymes: an activating enzyme (E1), ubiquitin-conjugating

enzyme (E2), and ubiquitin-ligating enzyme (E3). The SCF complex, comprised of Skp1, Cul1, Roc1/Rnx1 and a variable F-box protein, is a well-characterized ubiquitin-ligating E3 enzyme complex. Fbs1 (97-297) is a glycoprotein specific F-box protein which interacts with glycoproteins containing high-mannose oligosaccharides (N-glycans). Specifically, Fbs1 recognizes the internal diacetylchitobiose structure in N-glycans. Since the internal chitobiose of N-glycans in native glycoproteins is not accessible, denatured glycoproteins exposing the N-linked oligossacharides serves as a signal which is recognized by Fbs1. The objective of this research is to characterize the affinity and kinetics of Fbs1 for denatured RNAse B through Surface Plasmon Resonance (SPR) and to further investigate its specificity for related N-glycan structures via glycan array screening. Fbs1 is expressed and purified using an engineering pGEX-6P-1 plasmid. It is first expressed as GST fusion protein into E.coli BL21 (DE3) Codon Plus RIPL strain and purified using a GSTrap FF 1ml column through on-column cleavage of Fbs1 from GST by PreScission Protease cleavage at an engineered cleavage site. High purity Fbs1 is obtained through Size Exclusion Chromatography (SEC) and verified by SDS-PAGE, Western blot analysis, MALDI Mass Spectrometry (MS) and peptide MS fingerprinting through LC-MS/MS. SPR affinity and kinetic analysis of Fbs1 for target denatured RNAse B containing a single N-glycan site indicates a disassociation constant (KD) of 13 uM and disassociation rate (koff) rate of 9.87 e-3 s-1. Additionally, the specificity of Fbs1 is further investigated by screening fluorescently labeled Fbs1 on glycan arrays provided by the Consortium for Functional Glycomics. These results will help determine the utility of Fbs1 as an affinity capture reagent for N-glycan bearing peptides and glycoproteins.

The Effects of Volume Removal on Values of Factional Anisotropy

David Parker
Dr. Jennifer McDowell, Psychology, Franklin College of Arts & Sciences

Diffusion Tensor Imaging (DTI) is a form of Magnetic Resonance (MR) technology that allows for non-invasive characterization of brain anatomy by measuring the diffusion of water molecules within the brain tissues. DTI is especially useful for examining connectivity between brain regions and is a new analysis technique that will have important clinical relevance towards a variety of brain pathologies that affect the integrity of these connections. In order to quantify the degree of connectivity between brain regions, fractional anisotropy (FA) values are calculated based on the average magnitude and direction of water diffusion. During data collection, a common problem is that slight movements can cause artifacts among the many brain images that contribute to the average FA value, which compromises the data. Standard practice is to visually inspect the data and to eliminate images with artifacts. Our goal is to examine the effects of volume reduction (i.e. elimination of poor quality images) on FA. Quality diffusion weighted images (30 diffusion encoded directions) from a single subject were chosen from a larger study and used as a baseline. From these baseline images, we systematically altered the number of diffusion weighted directions that contributed to that image in order to examine the effect of volume removal on FA. By comparing a complete data set that has no artifacts with a data set that has had volume reduction, we hope to determine a reasonable threshold for the number of diffusion encoding directions needed to preserve the validity and quality of data.

Abstracts

Investigating Post-Translational Modification and Activity of Zebrafish Glycosidases

Joshua Parker, CURO Summer Fellow, CURO Scholar Graduation Distinction
Dr. Richard Steet, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Zebrafish (*Danio rerio*) has emerged as a popular model organism to study human diseases including lysosomal storage disorders. In order to better understand the regulation and function of lysosomal hydrolases in this system, the activity and post-translational modification of specific glycosidases has been investigated using wild type and mutant zebrafish lines. A characterization of a novel beta-galactosidase enzyme with a pH optimum near neutral was conducted. The results show that this activity is tissue-specific, distinct from the lysosomal beta-galactosidase and does not depend on the presence of soluble co-factors. A potential role for this nuetral glycosidase activity could be extracellular remodeling of cell surface sugar chains. The maternal deposition of N-acetylglucosamine-1-phosphotransferase, the enzyme responsible for initiating the addition of mannose 6-phosphate residues to lysosomal hydrolases, was also investigated. A mutant zebrafish line deficient in its gamma subunit was utilized for genetic and biochemical analysis. Following a series of genetic crosses, the embryonic activity of four glycosidases was measured at different stages. These experiments provide strong evidence for the maternal deposition of N-acetylglucosamine-1-phosphotransferase into zebrafish eggs and set the stage to explore the function of mannose phosphorylation in the development of oocytes and embryonic growth.

Cognitive Differences Between Objective and Subjective Memory Complaints

Anisha Patel
Dr. L. Stephen Miller, Psychology, Franklin College of Arts & Sciences

Mild cognitive impairment (MCI) is a term used to define an older adult who has a deficit in a specific cognitive domain that is greater than expected for their age. This category includes problems with memory, language, attention, or reasoning. Recently, an area of contention has been whether objective and subjective memory complaints differ cognitively, which is of particular importance given subjective memory complaints are a requirement for MCI. My hypothesis is that older adults with subjective memory complaints would not differ from individuals without complaints. I suggested that personality factors may account for the complaints, particularly neuroticism which has been previously researched and seems to be an indication of memory loss. We evaluated 57 older adults aged 65-85 on several factors. Using the Immediate and Delayed memory scores from the RBANS, I conducted a two tailed Spearman correlation, a regression, as well as a t-test. I also completed a two tailed Spearman correlation and independent samples t-test to see whether the personality factors were related subjective memory complaints. I found that there is no difference in immediate or delayed memory between someone reporting a memory problem and someone who isn't. Interesting, personality factors did not account for the difference. This suggests subjective memory complaints may not need to be required in order to determine if a patient suffers from MCI. Further research must be done to verify what may be accounting for subjective memory complaints, given there were no memory performance differences or personality differences as I had expected.

Abstracts

Stable Cell Line Engineered with shRNA Against TMPRESS2 Protease to Reduce the Infection of Influenza Virus

Nisarg Patel,
Christopher Lee
Dr. Ralph Tripp, Infectious Disease, College of Veterinary Medicine

The cleavage of hemagglutinin (HA) protein with the use of host cell protease is required for influenza virus to gain entry into the cell. Previous studies have found that TMPRSS2 protease plays a significant role in the infectivity of influenza virus. During this study Lentivirus was used for the insertion of shRNA against TMPRSS, Red fluorescent expression, Puromycin selection gene, as well as Doxycycline induction to create a stable cell line which can be tested to determine the role of TMPRSS in influenza infection. The cell line was passage through fluorescent cell sorter as well as Puromycin selection to create clone cell lines. Gene silencing was validated with the use of PCR which demonstrated that there was a significant difference in the level of TMPRSS2 between Doxycycline induced and non-induced clones. Upon induction with Doxycyclin, TMPRSS2 silencing RNA is produced which blocks the production of TMPRSS2 RNA. The blocking leads to a decrease translation of TMPRSS2 and without the protease activity of TMPRSS to cleave influenza hemagglutinin (HA), the infection of host cell is reduced. The assay results demonstrated that the induction of the clone does decrease the infection of influenza virus.

Reducing Costs and Maintaining Quality: Alternatives to Fee-for-Service in Federal Health Insurance Plans

Yiran (Emily) Peng, Ramsey Scholar
Dr. Phaedra Corso, Health Policy & Management, College of Public Health

The fee for service system (FFS), the current way federal health insurance programs reimburse physicians, encourages financial waste and lowers the quality of U.S. healthcare. In 2009, the U.S. spent $2.5 trillion or 17.3% of its annual gross domestic product on healthcare, ranking number one in spending compared to all other industrialized countries. Despite this large investment, the World Health Organization ranks the U.S.'s healthcare system 37th out of 191 countries in performance and quality. FFS exacerbates the divide between cost and quality in a few significant ways. Payment by service provides incentives for excess spending and fraud. This rise in spending leads to health inequities by denying care to those who cannot afford it. In addition, FFS is a barrier to integrated care in that it rewards individual procedures, fragmenting patients into separate symptoms. To address these problems, Medicare should implement a capitated system that integrates insurance companies, hospital systems, and provider networks to cut costs and improve quality. A cost benefit analysis, as well as a thorough literature review indicates that replacing the FFS payment schedule removes incentives for physicians to order unnecessary procedures that increase waste. Paying physicians at a fixed, capped rate curbs health costs by eliminating the incentive for unnecessary procedures and offers more affordable care. At the same time, HMOs increase spending regulation and reduce fraud. To improve quality, a capped and integrated system gives incentives to hospitals, physicians, and insurance companies to collaborate and better serve their patients. Although the U.S.'s overall spending on health care will not dramatically change under this new policy, patients will receive increased quality per dollar under a capitated system, ultimately reducing the disparity between spending and quality-care in the U.S.

Narcotics-Trafficking, Cloudforests, and a Killer Fungus: Amphibian Conservation in Central America

Todd Pierson
Dr. John Maerz, Warnell School of Forestry & Natural Resources

Amphibians are the most threatened group of vertebrates, and the highlands of Central America are home to one of the greatest diversities of salamanders worldwide. In addition to the ubiquitous effects of deforestation, an epidemic fungal infection—chytridiomycosis—has led to the extinction of dozens of species in the region. Despite great losses in the amphibian diversity of neotropics, the number of nominal species continues to increase as taxonomic studies reach their maturity. In the last sixteen months, I have joined the Museum of Vertebrate Zoology of the University of California Berkeley on three expeditions to Guatemala and Honduras to search for new species of amphibians, assess the status of remaining forest, and plan for the conservation of these threatened species. Here I present the results of these expeditions, a complicated success story of conservation in the Sierra Caral, and a plan for future conservation.

Arabian Nights: Preliminary Survey of Herpetofauna and the Phylogeography of *Bufo dhufarensis* (*Bufonidae*) in Oman and the United Arab Emirates

Todd Pierson
Dr. John Maerz, Warnell School of Forestry & Natural Resources

Amphibians and reptiles of the Arabian Peninsula are composed of groups of both African and Asian origin and previous phylogeographic studies have revealed radically different histories for different taxa. I spent six weeks in June and July 2011 collecting herpetofauna from Oman and the United Arab Emirates on an expedition with the Museum of Vertebrate Zoology. We collected more than 300 specimens of more than 45 species, including both amphibian species of this arid region—*Bufo arabicus* and *Bufo dhufarensis*. The latter species is of particular interest, as its affinity for oases creates a highly disjunct geographic range across the region, and further analysis of interpopulation genetic variation may reveal some cryptic diversity. Here, I present a summary of previous herpetological phylogeographic research done in the region, the results of our 2011 expedition, and outline a phylogeographic study of *Bufo dhufarensis* that I will conduct in the summer of 2012.

Regulation of the Cell Cycle in the African Trypanosome by Small Molecule Inhibitors and Serum Deprivation

Daniel Pique, CURO Scholar Graduation Distinction
Prof. Kojo Mensa-Wilmot, Cellular Biology, Franklin College of Arts & Sciences

Human African trypanosomiasis, a disease caused by the protozoan *Trypanosoma brucei,* lacks safe and effective treatment options. Cell-permeable molecules can serve as lead anti-trypanosome chemicals or tools for cell cycle studies. Current protocols for *T. brucei* cell cycle synchronization use hydroxyurea to arrest in S phase. Herein, we present a new serum deprivation protocol that arrests trypanosomes at G1, as verified by two independent methods: flow cytometry evaluation of DNA content per cell and organelle duplication analysis by microscopy. Trypanosomes lack epidermal growth factor receptor (EGFR) and vascular endothelial growth factor receptor (VEGFR). However, we discovered that AEE788, a small molecule that inhibits EGFR and VEGFR tyrosine kinases in human cells, blocks Tyr phosphorylation in the trypanosome and arrests *T. brucei* in G1. Since *T. brucei* lacks EGFR and VEGFR, we used chemical proteomics approaches to identify three novel protein kinase targets of AEE788. With AEE788 and serum-deprivation both

arresting at G1, the possibility of synergism between the drug and serum factors was explored. Surprisingly, serum-starved trypanosomes are no longer susceptible to AEE788 inhibition. We present a new hypothetical model that links a serum factor to AEE788-susceptible protein kinases in regulation of the trypanosome cell cycle.

Aporetic Structure in Marcel Proust's *In Search of Lost Time*

Sarah Potter
Dr. Andrew Zawacki, English, Franklin College of Arts & Sciences

By researching works of literature, theory, and criticism by Georges Bataille, Maurice Blanchot, Roland Barthes and others, I will investigate an aporetic structure—an impasse that is inherent in the nature of a situation or being—recurrent throughout my primary source, Marcel Proust's *In Search of Lost Time*. For Proust, nothing is truly experienced because of an aporia of presence and time. An event is not realized until experienced a second time, in a reincarnation that imparts meaning to the original experience. The latter becomes real by its dependency on this secondary experience, when Proust cannot be present for the original. While the essence of the first instance is preserved, Proust witnesses it outside of its place in time. He is torn between living in the present, building experiences without perspective in time, and reiterating his past to gain significance. This aporia futures capacity for experience, since it requires an impossibility in time. Applying this structure to experiences of color, travel, architecture, romantic love, writing, and more, Proust's narrator replicates a series of "little deaths," or limit experiences, that mimic the grandest iteration of aporetic experience: one's own death. Knowing one's death is impossible, for the moment it takes place, one is no longer present. This thesis will define the limit experience and nature of Proust's aporias before proving this structure and its fundamental importance across themes and dynamics threaded throughout Proust. I hope that my findings will cast new understanding on Proust's work and its nuances.

Finding the Child in Children's Literature

Lea Rackley, CURO Summer Fellow
Dr. Katarzyna Jerzak, Comparative Literature, Franklin College of Arts & Sciences

As a child of twelve I was disengaged not just from school, but also from the world and its possibilities as I saw them. Coincidentally, the child protagonists of the books I read were similarly disengaged. As an English Education major, I have wondered how I might have responded, at twelve, to portrayals of children not stereotypically disengaged but enamored of the world. In this autoethnographic study, I draw on experiential knowledge to consider the importance of how literature is chosen for children–with particular consideration of their individual needs—both within the classroom and outside of it. I compare various portrayals of the child protagonist throughout world children's literature, examining their orientations to issues identified as fundamental to the emotional and developmental needs of children. I consider the child portrayed as recognizing love as responsibility, the child seeing loss, fear, grief, and sorrow as enabling growth, strength, and endurance, and the child seeing learning not as compartmentalized within the classroom, contained within homework, but inseparable from the child's world. By contributing to the discussion about children's literature from this interdisciplinary perspective, and by suggesting standards upon which works are chosen for students, I also hope to contribute to thinking about the way children's literature is taught. With children's emotional and developmental needs as the primary focus of my work, reading, and analysis, this study looks for works that help children see themselves and their strengths more clearly.

Abstracts

Predictors of Tick Burden and Engorgement in Grant's Gazelle

Malavika Rajeev, CURO Summer Fellow, CURO Scholar Graduation Distinction
Dr. Vanessa Ezenwa, Odum School of Ecology

Despite the negative effects of tick infection and the widespread distribution of ticks in African ungulates, very little is known about the factors that affect patterns of tick infestations in this group of hosts. Our study examined possible predictors of tick burden and engorgement rates in the Grant's gazelle (*Nanger granti*). We captured 61 gazelle at the Mpala Research Centre, Kenya in June 2011; and sex, age, body weight, body size (body length and neck circumference), overall tick burden, and number of engorged ticks were assessed for all individuals. We found that females and younger animals had a higher average tick burden than males and older individuals. Body weight was negatively associated with tick burden, while body size was positively associated with tick burden. Body weight and body size were also significantly correlated with the proportion of engorged ticks, whereas sex and age had no significant effect. Our results support previous studies examining tick infestations in small mammals, which show that tick burden typically increases with body size. On the other hand, the negative correlation between body weight and tick burden may reflect the effect of body condition rather than size. Our results also suggest that body size and weight may affect tick engorgement. Overall, our study contributes to a better understanding of the relationship between intrinsic host factors and tick parasitism.

Relations of Substance Use to Constructive Communication and Sexual Violence in Young Adults' Romantic Relationships

Michael Rausher,
Isabel Cohen
Dr. Anne Shaffer, Psychology, Franklin College of Arts & Sciences

The present study aims to better identify the relations between marijuana use, communication patterns, and interpersonal violence in young adults' dating relationships. Research suggests substance use may contribute to negative relationship outcomes and impact adults' abilities to form and maintain romantic relationships (e.g., Fals-Stewart, 2003). Additionally, current research indicates substance use may serve as a proxy for other deviant behaviors (e.g., Kilpatrick et al., 1997). While evidence supports relations between alcohol use, cocaine use, and sexual violence, less is known about if, how, and to what extent marijuana use may relate to interpersonal communication and sexual violence in college students' romantic relationships (e.g., Fals-Stewart, 2003; Ramisetty-Mikler et al., 2007). This paucity of information is important considering marijuana is one of the most readily available and frequently used drugs on college campuses. The present study utilized a sample of 62 undergraduate dating couples. Marijuana use was defined as reporting using marijuana three or more times during your life. Results indicate that there are significant differences between marijuana users and non-users regarding self-reports of Constructive Communication, measured by the CPQ, $t\,(60) = 2.98$, $p = .004$, and self-reports of perpetrated sexual violence, measured by the CTS, $t\,(60) = -2.90$, $p = .005$. Future research should explore the possible mechanisms through with the relation between marijuana and interpersonal violence functions.

Abstracts

Haemogregarines of Freshwater Turtle Species: Does Basking Behavior Influence Parasitemia Levels?

Luben Raytchev, CURO Summer Fellow
Dr. Michael Yabsley, Warnell School of Forestry & Natural Resources

Haemogregarines are intracellular blood parasites of freshwater turtles. These parasites are considered nonpathogenic and are transmitted by leeches. Although common, many aspects of the parasite-host relationship have yet to be elucidated. This project seeks to compare the parasitemias of haemogregarines among common species of freshwater turtles. We hypothesize that behavior (basking vs non-basking) will influence parasitemia levels with baskers having lower numbers of parasites. Turtles were trapped and bled at numerous locations in Georgia (Baker Co., in South Georgia and Clarke and Madison Cos., in North Georgia) and various ponds in Ingham Co., Michigan. In total, 90 turtles of 10 species from Georgia and 94 turtles of 5 species from Michigan were tested. Thin blood smears were made, fixed in methanol, and stained with Giemsa. Smears were analyzed under a light microscope (100x) to determine 1) whether haemogregarine parasites were present and 2) the parasitemia level within each turtle (based on number of infected cells per 7,000 cells examined). To date, no differences were noted in the parasitemias detected in Georgia or Michigan turtles, in general ($p = 0.338$), or by basking behavior (baskers, $p = 0.2766$; non-baskers, $p = 0.3382$). In contrast, significantly higher parasitemias were noted in non-baskers compared with baskers (Georgia and Michigan combined, $p < 0.0001$; Georgia only, $p = 0.004$; Michigan only, 0.003). These results indicate that basking behavior has a significant impact on the haemogregarine parasitemia levels in turtles. Currently it is unknown if basking reduces parasite burdens by limiting exposure to leeches or by increasing the immune response of the host.

Does Eggshell Pigmentation Reflect Female Condition in Broiler Breeder Hens?

Chelsea Renier
Dr. Kristen Navara, Poultry Science, College of Agriculture & Environmental Sciences

Brown eggshell pigmentation varies substantially among chicken eggs and is generated by the pro-oxidant protoporphyrin, a metabolite intermediate formed during the biosynthesis of heme. Protoporphyrin can cause oxidative stress damaging cells and tissues, creating reactive oxygen species, and inhibiting antioxidant systems. The hen's ability to sustain high levels of protoporphyrin in the blood for deposition into eggshells may convey information about female condition. Due to the costs of protoporphyrin generation and deposition, a positive correlation might be expected to exist between female condition and egg color. To test this, six consecutive eggs were collected from each of thirty-one broiler breeder hens and colors were analyzed using a 10 megapixel digital camera and Adobe Photoshop software. During the period of egg collection, the condition of each hen was assessed through weighing, tarsus length measurements, and blood collection for subsequent analysis of circulating levels of corticosterone (a stress hormone), heterophil/lymphocyte ratios (a measure of stress and immunity), and total antioxidant capacity of blood. Condition indices were then related to average measures of hue, saturation, and brightness to determine whether darker egg colors reflect better female condition. We predicted that hens laying darker eggs would weigh more, have lower stress indicators, and a better antioxidant capacity. Results may help determine hen quality in the poultry industry.

Abstracts

DNA Hybridization in the Presence of Single-Walled Carbon Nanotube/ssDNA Complexes

Julian Rios, CURO Honors Scholar
Dr. Marcus Lay, Chemistry, Franklin College of Arts & Sciences

Single walled carbon nanotubes (SWNTs) are cylindrically shaped carbon molecules that have exceptional structural, electrical, and thermal properties. Due to their unique characteristics, SWNTs may form reliable and efficient biosensors for proteins, sugars, and DNA. Single stranded DNA (ssDNA) readily binds to SWNTs because the positively charged base pairs on the DNA are attracted to the loosely bound sp2 hybridized electrons in a SWNT. Due to this electrical interaction, DNA unwinds and wraps around a SWNT, allowing the nanotube to act as a mediator during the formation of double stranded DNA. The DNA/SWNT complex not only allows for SWNTs to readily dissolve in water, but also enhances the detection of DNA using Raman spectroscopy through surface enhanced Raman scattering (SERS). The DNA/SWNT complex is formed by adding ssDNA to a solution of dispersed SWNT in sodium dodecyl sulfate (SDS). The SDS was later removed through dialysis. After binding was detected by UV-Vis spectroscopy, the complementary strand of ssDNA was added and allowed to hybridize to the DNA bound to the nanotubes. All unbound DNA was then removed from the solution using dialysis. The final suspensions were analyzed using UV-Vis-NIR spectroscopy. The suspensions were also deposited on copper nanoparticles for characterization with SERS. Once functionalized, the increased solubility and enhanced detection allow the DNA/SWNT complex to be an excellent biosensor which can lead to the more effective detection of early treatment of diseases such as diabetes and Parkinson.

An Examination of Communication and Employee Engagement

Stephen Robertson,
Aaron Murray
Dr. Karl Kuhnert, Psychology, Franklin College of Arts & Sciences

The present study seeks to examine the relationship between management communications and employee engagement. More specifically, we propose to focus on manager relations as a mediating variable in the relationship between communication and engagement. The current literature on organizational leaders and perceived organizational support provide a theoretical background for the relationship between communication and manager relations. As salient representations of the organization, leaders play an important role in establishing perceived organizational support through giving meaning to organizational activities (Baranik, Roling, & Eby 2009; Cherniss, 1995; Drath & Palus, 1994; Smircich & Morgan, 1982). Utilizing literature from Blau's (1964) social exchange theory support can be found for the relationship between manager relations and engagement. The present study sample includes 2,557 participants from a large Fortune 50 company. From these participants, we will compare the nature of the mediated relationship for both managers and non-managers.

Combatting Obesity by Eliminating Food Deserts in Athens-Clarke County

John Rodriguez
Dr. Gail Hanula, Foods & Nutrition, College of Family & Consumer Sciences

Athens-Clarke County mirrors the rising trend in obesity seen at national and state levels. From 2004 to 2008, the adult obesity rate in Athens increased from 24.7% to 27.1%–a rise of 10% in just over four years. Excess body fat is detrimental to individuals and societies, fostering chronic health conditions and causing higher annual medical costs. More

and more, research and policy interventions are targeting community-level environments as a way to address the persistence of obesity. Of particular importance in Athens-Clarke County is the food desert, which is any low-income tract where a high percentage of individuals face limited financial and geographical access to a full-service grocery store. Approximately 20% of the Athens population lives in such conditions, relying on convenience stores that do not provide for an adequate, balanced diet. This project attempts to analyze the shortcomings of current policy in Athens-Clarke County to combat rising obesity rates. It draws on literature examining community-wide intervention obesity initiatives, supplementing it with expert opinions from Athens officials. The project proposes three possible courses of action to eliminate food deserts as a method of combatting obesity in Athens-Clarke County: (1) implementing farm to school programs; (2) funding a mobile farmers market; and (3) expanding community gardens. After a multigoal (effectiveness, cost, feasibility) analysis, the research concluded that a combination of farm to school programs and a mobile farmers market would be the best policy to decrease the obesity trend and encourage healthier lifestyles.

No Triumph Without Loss: Problems of Interracial Collaboration in Tolkien's Works

Hope Rogers, CURO Summer Fellow, CURO Scholar Graduation Distinction
Dr. Jonathan Evans, English, Franklin College of Arts & Sciences

Tolkien peopled his fantastic world of Middle-earth with various races, from Elves and Dwarves to Hobbits and Men, and further subdivided those races into different ethnicities and cultures. Although many critics have discussed Tolkien's races, few have taken a comprehensive look at them from a real-world perspective, and still fewer have gone beyond praising Tolkien's celebration of diversity to explore the loss that accompanies it in his stories. Through an exhaustive study of Tolkien's works and letters, as well as relevant criticism, this study examines how the interactions of Tolkien's races relate to modern race issues. It focuses on his portrayals of the causes of conflicts and the problems that accompany other racial interactions, such as trade inequalities and acculturation. Tolkien uses Middle-earth as an arena to play out issues of prejudice, exploitation, and globalization and to explore possible responses as different as isolationism and intermarriage. He thus challenges readers to look at the ultimate consequences of such responses and to reevaluate supposedly ideal solutions. Far from being escapist fantasy, Tolkien's works have a unique relevance to the real world with their all-too-real pictures of the complexities of racial interactions.

The Skeleton in the Closet: Deadly Duplications in Mary Shelley's *Frankenstein*

Hope Rogers, CURO Summer Fellow, CURO Scholar Graduation Distinction
Dr. Michelle Ballif, English, Franklin College of Arts & Sciences

Pieced together from the bodies of men and beasts, the monster from Mary Shelley's *Frankenstein* has fascinated casual readers and critics alike. And of the many critics who have written about the novel, a small yet significant number have explored its themes of race and miscegenation, describing the monster as a racially Other or miscegenated being. These critics, however, have failed to notice the book's overriding drive for homogeneity that ultimately characterizes the monster not as the Other but as Victor's double. In my in-depth analysis of the novel, I first establish how the Frankensteins and other characters preserve the integrity of their homogenous community and prevent contamination by difference by constantly duplicating themselves, absorbing and thus effacing difference through semi-incestuous

relations and assimilatory practices. These doublings threaten the Hegelian dichotomy between Self and Other, in which the Self can only exist by being defined against an Other. This threat is realized in Victor's unnatural creation of the monster, his perfect double, which totally destroys the Other, breaking the dichotomy and resulting in the death of Self, a consequence acted out through the monster's murders. Shelley's novel is thus a tale not of difference, racial or otherwise, but of the destructiveness of forced homogeneity, a reading that both highlights the novel's complexities and provides a forceful reflection on our own world.

The Implementation of Effective Smoking Cessation Interventions for Drug and Alcohol Addicts in Substance Abuse Treatments

Mark Rolfsen, CURO Summer Fellow
Dr. Jessica Muilenburg, Health Promotion & Behavior, College of Public Health

The prevalence of smoking among individuals in substance abuse facilities is very high, between 70%-95%. However, only 51.3% of drug treatment facilities in this study offered either medication or counseling for nicotine dependence. Previous research demonstrates that addiction to nicotine may affect the brain in a way that decreases the chance of prolonged sobriety. Understanding what characteristics of treatment facilities allow them to most effectively implement smoking cessation practices would be highly cost effective versus the alternative of dealing with patient relapses. The study that I worked with conducted telephone interviews with 850 directors of substance abuse facilities. I looked at two aspects of these interviews: factors that might influence a facility's likelihood of offering smoking cessation, and factors that are associated with a strong attitude towards smoking cessation. Three factors- staffing, training, and financials -were measured using questions answered on a 5-point scale. Out of these three areas, financials was the only factor that had a significant correlation ($p < .05$) with the prevalence of a smoking cessation program. Likewise, program director attitude was measured on a 5-point scale. Neither recovery status, time in the field, nor educational level had any correlation with a director's attitude towards the effects of smoking cessation on sobriety. However, the majority, 67.4%, of directors felt that smoking cessation increased a patient's chance of sobriety. Further analysis of which factors are important in implementing smoking cessation practices will hopefully yield higher levels of nicotine treatment, and therefore enhance the nation's ability to promote prolonged sobriety.

Architecture and Dress

Meghan Russell
Dr. Katalin Medvedev, Textiles, Merchandising & Interiors, College of Family & Consumer Sciences

My research investigated how architecture and dress (defined as modifications and supplementations to the body) are related, beyond both being essential for human survival. In order to explore modern collaborations between architects and designers, I closely studied art exhibits and investigated scholarly projects and ideas of fashion designers whose designs emulate architecture. From my research, I concluded that space and the way it is connected to the human body is the main driving force that links architecture and dress. We as humans not only conceive space as our environment in which we are located, but also view our bodies as our personal space. We wrap ourselves in clothing and enclose ourselves in a room within our homes or public buildings in similar ways. Both architecture and dress help us stay protected from the elements or the mocking of societies that often harshly judges the human form.

Abstracts

The Resistance Complex in Lyon: Politics, Memory, History

Kayci Schoon
Dr. Steven Soper, History, Franklin College of Arts & Sciences

Considering the essential role of the city of Lyon in the French Resistance, surprisingly little has been written specifically on this subject. The French Resistance movement and occupied France have been contentious topics ever since the release of Robert Paxton's *Vichy France: Old Guard and New Order*, which tore down decades of denial about France's collaboration with Germany. Lyon, as "the Capital of the Resistance," was Charles de Gaulle's base for the movement, placing Lyon's activities and prime résistants at the center of France's Gaullist myth – the idea that France was a nation of heroic résistants. This myth was useful for inspiring national unity and popularizing de Gaulle, but it also seeped its way into historical studies and memoirs, producing many misunderstandings about the nature of the Resistance. My goal is above all to demonstrate the true complexity of the Resistance in Lyon – that it did not comprise simply Lucie Aubrac and other idealized non-Jewish liberals, but it included Catholics, Communists, Jews, as well as a variety Gaullist movements, that struggled to reconcile their differences. When achieved, unity often meant to ignore their differences at the cost of nuance and accuracy, as is reflected in the language of Gaullist clandestine newspapers and de Gaulle's vague speeches. I also demonstrate the breadth of the Lyonnais Catholic resistance movement, which has often been overlooked despite its significant achievements and drawbacks. In so doing, I hope to emphasize Lyon's role in the formation of the French Resistance myth, and how breaking down the myth through the Lyonnais paradigm will help us better understand the reality of the Occupation.

Progress Toward Sustainability Goals at UGA's Costa Rica Campus in San Luis de Monteverde, Costa Rica

Dana Schroeder, CURO Summer Fellow
Dr. Quint Newcomer, Odum School of Ecology

Since its inception in 2002, UGA Costa Rica (UGA CR) in San Luis de Monteverde has operated under a business model that heavily emphasizes environmental, social, and economic sustainability. Hosting an average of 27 students, faculty, researchers, and tourists per night in 2010, this cloud-forest campus has been developed to protect the surrounding ecosystem, support the local economy, and immerse guests in the local culture. Progress toward sustainability goals is investigated and reported in an annual sustainability report. Documents including management plans, protocols, accounting records, and resource use data compiled for the *2011 Sustainability Report* show that UGA CR is meeting monthly targets for resource use in 10 months out of the year, 82.5% of waste is being diverted from landfills, and some organic waste is even being converted to cooking fuel in the campus's new biodigestor. After interviewing staff and hosting departmental meetings to complete the Earth Charter Ethics-Based Assessment Tool, we have indicated potential areas for improvement. Specific focus could be placed on improving commitment to poverty eradication, expanding on-site renewable energy generation, and raising awareness for environmental issues through mass media. Indicating these areas for improvement and making recommendations for future initiatives will ultimately help UGA CR reach its goals listed in the *Vision for 2015*, earn a higher rating in the Certification for Sustainable Tourism, and set an example for the UGA community in Athens to incorporate more sustainable practices into its operations.

Abstracts

Assessing Rce1-Protease Inhibition in a Cell-Based Fluorescence Ras Localization Assay

Daniel Sharbel, CURO Summer Fellow
Dr. Timothy Dore, Chemistry, Franklin College of Arts & Sciences

Ras proteins function at the plasma membrane to induce several intracellular pathways, some of which are involved in cell proliferation. If the Ras gene is mutated to become constitutively active, cell cycle misregulation and rampant cell growth may occur, leading to tumorigenesis. In the second of three post-translational modifications to the Ras carboxy-terminus CaaX motif, Rce1p endoproteolytically cleaves the -aaX sequence after prenylation of the free cysteine thiol. Rce1p is an ideal target for Ras inhibition since it is a universal modifier of proteins in the Ras superfamily. Previous findings show that small molecule inhibition of Rce1p activity in *S. cerevisiae* causes Ras mislocalization, but investigation of inhibition in mammalian cell culture has not been conducted. Our study utilized a simple fluorescence-based cell culture assay to assess the ability of small molecule inhibitors of Rce1p to cause Ras mislocalization in mouse embryonic fibroblast (MEF) cells. We transfected both null *(Rce1-/-)* and wildtype (*Rce1+/+*) cells with a green fluorescent protein-tagged Ras isoform (GFP-KRas4B) plasmid construct as positive and negative controls, respectively, and observed the degree of Ras localization to the plasma membrane with fluorescence microscopy. A distinct, binary difference in phenotype between *Rce1-/-* and *Rce1+/+* MEFs was not initially observed, so we conducted a time-trial transfection and imaged cells under a confocal microscope at 24, 36, and 48 h. Our assay shows that the GFP-KRas4B construct is not ideal for studying Rce1p inhibition. Other GFP-tagged Ras family members, like GFP-Rnd3 and or GFP-RhoB, may be more suitable to quantify inhibitor activity.

Intravenous Minocycline and Its Effect on Peripheral Interleukin-6 After Ischemic Stroke

Andrea Sikora, CURO Scholar Graduation Distinction
Dr. Susan Fagan, Clinical & Administrative Pharmacy, College of Pharmacy

Due to a favorable safety and pharmacokinetic profile, anti-inflammatory activity, demonstrated compatibility with t-PA, and efficacy in multiple pre-clinical stroke models, minocycline shows potential to improve therapeutic outcomes in ischemic stroke. In this early phase trial of intravenous minocycline in acute ischemic stroke patients, blood samples were collected to quantify the effect of minocycline on inflammatory biomarkers. IL-6 levels have been associated with stroke severity and clinical outcome. Following an open-label, dose-escalation design, minocycline was administered intravenously within 6 hours of stroke symptom onset in preset dose tiers of 3, 4.5, 6, or 10 mg/kg daily over 72 hours. Blood samples for biomarker analysis were drawn at 24 after symptom onset and analyzed using ELISA techniques. The effects of minocycline on interleukin-6 were subsequently compared to a historical control group and literature values of IL-6 in acute ischemic stroke. A statistically significant association was found between patients that received minocycline and non-detectable IL-6 levels, with patients receiving minocycline 7.16 times (95% CI 2.64-19.38) more likely to have a non-detectable IL-6 level than those patients that did not receive minocycline. In conclusion, minocycline shows robust anti-inflammatory activity and prevents the rise in IL-6 levels due to ischemic stroke

Abstracts

Proteomics Analysis of Canine Prostate Carcinoma Tissue: A Potential Animal Model of a Human Disease

Peter Sisk
Dr. Ron Orlando, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Animal models have often been used in cancer research due to neoplasms that exhibit similar characteristics to human cancers. Male humans and canines are the only large mammals that spontaneously develop prostate cancer, exhibiting a potential model for human prostate cancer. In this work, a GeLC-MS proteomics approach was used to identify protein expression from normal and carcinoma canine prostate tissue. Soluble proteins were extracted from tissue samples and analyzed using an Agilent 1100 LC system interfaced online to a Thermo-Fisher LTQ mass spectrometer. Resulting LC-MS/MS files were database searched via Mascot, with identifications analyzed using ProteoIQ software. DAVID bioinformatics software was used to determine biological significance of identified proteins. Previously published proteomic data used MALDI MS/MS to analyze only proteins displaying more than a 2.5-fold difference between carcinoma and normal tissue samples using 2-D DIGE spots, leading to only 9 proteins being analyzed. Using the GeLC-MS/MS strategy, all potential proteins were analyzed in the carcinoma and normal prostate samples. Preliminary data shows that 942 total protein groups were identified with 863 of the proteins overlapping between the normal and carcinoma samples. Using differential analysis, 69 proteins were found only in the carcinoma samples, while 10 unique proteins were found in the normal cells. All identified proteins will be run through DAVID Bioinformations Resource to look for any biological pathways these proteins may be associated with.

Inferno

Daniel Smith, CURO Summer Fellow
Prof. Michael Marshall, Lamar Dodd School of Art

In his 14th-century masterwork, *Inferno*, Dante Alighieri describes a place where people exist entirely out of contact with God, having only each other and their own, self-willed damnation for comfort. In today's increasingly secular culture, Dante's *Inferno* retains a resonance less present in Purgatorio and Paradiso, precisely because the characters' utter isolation from God relates to contemporary culture's existential awareness. With the resources of a 2011 CURO Summer Fellowship, I investigated the literature and art surrounding Dante's poem to inform the creation of a large-scale, photographic illustration of the work. I quickly realized the difficulty in photographing the impossible images that I envisioned, and so I invented a method of photographic compositing emphasizing contemporary art techinques for contemporary audiences. The ultimate result of two semesters using this new method is "Inferno," a 5'x27', Last Judgment-themed photomural, illustrative of ideas and aesthetics in Dante's masterwork, numerous Italian and Northern European Renaissance artworks, and historic photographic practices. In my photomural I attempt to portray many of Dante's characters, while reinventing them and structuring my own vision of the world that they inhabit. This world is not merely relevant to the wicked but to all people. "Inferno" is more than a recapitulation of Dante's hell; it is a contemporary, human hell which tells the divine tragedy of man's story.

Characterization of a Putative Endonuclease-RNA Complex Involved in CRISPR-Mediated Viral Defense

Justin Smith, CURO Summer Fellow
Dr. Michael Terns & Dr. Rebecca Terns, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Genomes are under the constant threat of deleterious alteration or disruption from exogenous genomic elements such as viruses, transposable elements, or plasmids. Consequently, evolution has led to the creation of defensive systems that function to protect cellular genomes from attack. One such system, the CRISPR-Cas System, discovered in prokaryotic organisms has the ability to not only silence invaders but also to acquire heritable immunity from genome invaders. My focus resides with a prokaryote that outlines a well-studied CRISPR-Cas system. This bacterium, *Streptococcus thermophilus*, has recently been shown to have the ability to acquire resistance to a number of bacteriophages through destruction of invader-derived dsDNA1. The Cas protein, Csn-1, has been found to be required for this invader silencing, however its precise role in defense has yet to be determined. My goal is to determine the role that Csn-1 plays in defense of silencing invaders, possibly through direct cleavage of invader dsDNA and/or a potential role in the crRNA biogenesis. I will test the ability of Csn-1 to cleave invader-derived dsDNA using a crRNA guide to determine if Csn-1 functions in the Invader Silencing Stage of the CRISPR-Cas immune pathway. If catalytic activity is observed directly by Csn-1, the putative catalytic residues will be substituted through site-directed mutagenesis to assess whether these amino acids are required for catalysis as well as which predicted endonuclease active site is responsible for cleavage. Finally, to ensure the findings are physiologically relevant, I plan to reintroduce the mutant Csn-1 proteins into a mutant strain of *Streptococcus thermophilus* that lacks Csn-1, and assess effects on crRNA biogenesis and invader (phage and/or plasmid) silencing. These findings will provide the first molecular details of CRISPR mediated silencing of invader-derived dsDNA.

1 Garneau J.E., Dupuis M., Villion M., Romero D., Barrangou R., Boyaval P., Fremaux C., Horvath P., Magadan A., Moineau S. (2010). The CRISPR/Cas bacterial immune system cleaves bacteriophage and plasmid DNA. *Nature 468*, 67-71.

Determination of Virulence Factors Associated with *Histomonas meleagridis*' Cause of Blackhead's Disease in Gallinaceous Birds

Matthew Smith
Dr. Robert Beckstead, Poultry Science, College of Agriculture & Environmental Sciences

Histomonas meleagridis is the causative agent of Blackhead Disease in gallinaceous birds. It causes cecal inflammation and can spread to the liver leading to liver failure and death. This disease is known to have 80-100% mortality in turkey flocks. In a previous study, *H. meleagridis* was shown to lose virulence upon passage in culture suggesting a variation in pathogenicity that is also observed in the field. Our lab has identified potential virulence factors whose expression is lost upon passaging in laboratory cultures. To test the ability of these genes to cause disease, we are designing experiments to express putative virulence factors in a non-virulent strain of *H. meleagridis* via transgenesis. We are currently designing a transformation protocol specifically for *H. meleagridis*. My research project has been to design, generate and test this expression system. To do this, we cloned the *H. meleagridis* beta-tubulin promoter upstream of the neomycin resistant gene. A polyadenylation signal sequence was also cloned downstream of the neomycin gene to promote stable mRNA expression. Currently we are testing several electroporation

conditions to assess the ability of this construct to confer resistance to G418. Upon successful transformation of *H. meleagridis,* we will generate new vectors that contain sequences encoding virulence factors in place of the neomycin resistance gene, and test their affect the pathogenicity of *Histomonas meleagridis* in turkeys. Virulence genes identified in these studies will be targets for future drug development and vaccine production.

Compelling State Interest: A Study of the Unequal Application of Strict Judicial Scrutiny

William Smith
Dr. Peter Hoffer, History, Franklin College of Arts & Sciences

The concept of judicial scrutiny surrounding the free exercise clause has created an extremely esoteric and controversial method for determining the outcome of particular cases in the Supreme Court. For centuries, Court Justices have struggled to find a procedure that effectively protects the free exercise of religion, while still maintaining the integrity of the federal and state legislatures. Eventually, the Supreme Court developed a balancing test known as "compelling state interest," which would place the burden on the state to prove that the law in question was necessary to protect the state's interest. Originally, this balancing test was widely accepted by religious and secular pundits, as it appeared to be a method designed primarily to protect religious rights while still allowing the state a process for overriding that right if necessary. However, this paper will discuss recent cases decided by the Court, which reveal that the justices do not use this balancing test objectively. Through the study of the justices' opinions in two Court cases involving the rights of Christian interests, as well as their opinions in two cases involving the similarly exploited rights of Native American interests, it is apparent that strict judicial scrutiny is not applied equally. In this paper I argue that law itself is not as impartial as it is often believed to be, and that the justices of the Supreme Court are often guided by the same economic interests and inherent racism the judicial system is designed to prevent.

The Science of Monitoring Rare Species: Developing Methods to Locate and Survey for the Endangered Bog Turtle

Theresa Stratmann, CURO Summer Fellow
Dr. John Maerz, School of Forestry & Natural Resources

North America's smallest turtle, the bog turtle (*Glyptemys muhlenbergii*), resides in the bogs of the eastern United States. Habitat loss and deterioration, as well as illegal collection for the pet trade, have resulted in this turtle being listed as Critically Endangered under the International Union for Conservation of Nature (IUCN) Red List. Cryptic and rare, it is extremely difficult to assess their population status. In addition, monitoring efforts are often done in a manner that cannot be used to estimate species detection rates, population abundance, or population viability. Time-effective methods of surveying for new populations are also largely lacking. To address these deficiencies several mentors and I are (1) developing a species distribution model (SDM) for the bog turtle to better predict where populations should occur, (2) determining the best methodology and minimal effort required to determine with confidence whether bog turtles are present at a site, and (3) testing the SDM and trapping methodology in South Carolina where bog turtles have not been seen in over a decade. Current analyses are based on what we have learned from a basic SDM and a season of mark/recapture data collected in Georgia using the new methodology. We hope this project will help state wildlife agencies in their efforts to conserve bog turtles. More generally, it is a case study that will contribute to designing robust monitoring of rare and cryptic species.

Abstracts

Proteome Studies of the Interation Between *Botrytis Cinerea* and Tomato Fruit

Andrew Suddreth
Dr. Carl Bergmann, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Botrytis cinerea is a pathogenic filamentous fungus that infects more than 200 plant species, many of which are of agricultural interest. *B. cinerea* secretes enzymes that degrade pectin, a major component in plant cell walls. This study tries to identify what proteins are secreted by the fungus at different time points during the growth period by using pectin as carbon source. To do this, a model system was constructed. We prepared a liquid pectin media to culture *B. cinerea* and we used tomato fruit, a known plant that *B. cinerea* infects, as our agricultural crop of interest. The first part of the project will be the standardization of protein extraction using a model system (liquid media). Once the protein extraction protocol had been standardized, we could identify the secreted proteins from the interaction between tomato fruit and *B. cinerea*. The liquid pectin media was inoculated with *B. cinerea* and samples were obtained every 24 hours for seven days. We followed a protocol to concentrate the secreted proteins for analysis. The concentrated proteins were then subjected to TCA protein precipitation, Bradford protein assay, SDS-PAGE gel electrophoresis, tryptic digestion, mass spectrometry and database searching. Proteins were identified by using a target database created by combining the *B. cinerea* BO5.10 (Broad Institute, MA), and T4 databases (Genoscope, France). A decoy database was constructed by reversing the sequences in the target database. Statistically significant proteins were determined for all of the samples at a 1% protein FDR using ProteoIQ Software.

Measuring Chronic Ankle Instability in a Recreationally Active Population

Christopher Sudduth, CURO Summer Fellow, CURO Scholar Graduation Distinction
Dr. Cathleen Brown Crowell, Kinesiology, College of Education

After suffering a lateral ankle sprain, a significant number of people report residual symptoms such as pain, swelling, instability, and a feeling of the ankle joint "giving way" during activity. These recurring symptoms have been coined Chronic Ankle Instability (CAI). This definition is vague and does not empirically quantify the degree of ankle instability. The aims of this study were to establish the reliability of the LigMaster, an instrumented ankle arthrometer, in assessing ligament laxity and to characterize CAI by evaluating the relationships between ankle laxity and self-reported ankle function. Twenty-four participants had lateral ankle ligament laxity assessed using the LigMaster. They self-reported scores of ankle function using two questionnaires. Two testers measured ankle laxity on multiple days for a subset of participants. Intraclass correlational (ICC) values were calculated to measure the reliability of the LigMaster. Correlation coefficients were calculated to measure relationships between ankle self-report function and ligament laxity. ICC values ranged from 0.00 to 0.90 on the LigMaster. Significant correlation coefficients were found between lateral displacement and questionnaire scores ($R=-0.476$ and -0.506; $p<0.05$). The LigMaster can be considered a reliable tool between testers on a single day and within a single tester on the same day. However, reliability across days is low to moderate. As ankle instability increased, self-reported ankle function decreased, in a moderate relationship. It appears the LigMaster can be reliably used to measure ankle laxity, and increased laxity is associated with poorer ankle function.

Pathogenesis of Chicken Astrovirus as Studied by In-Situ Hybridization

Lauren Sullivan, CURO Scholar Graduation Distinction
Dr. Corrie Brown, Pathology, College of Veterinary Medicine

The purpose of this study is to characterize the pathogenesis of disease caused by chicken astrovirus(CAstV). CAstV is a single-stranded positive-sense RNA virus reported to be a contributing agent in the runting-stunting syndrome (RSS) in broilers. Key features of RSS include diarrhea, delayed development, and increased mortality; however, little is known about the pathogenesis of the disease. For this study, chicken embryos were inoculated with CAstV, at 17 days of embryonation. The negative control group was inoculated with phosphate-buffered saline (PBS). Tissues were harvested at day of hatch (three days post-infection). In-situ hybridization was performed using a negative-sense digoxigenin-labeled riboprobe complementary to the polymerase gene of CAstV. In the CAstV-infected group, intestinal tissue from all infected birds demonstrated positive signal. Preliminary analysis indicates that the virus infects and replicates predominantly in the cells lining the sides of the villi.

The Interaction of Tau Proteins and Hirano Bodies

Connor Sweetnam, CURO Honors Scholar, CURO Summer Fellow
Dr. Marcus Fechheimer, Cellular Biology, Franklin College of Arts & Sciences

Alzheimer's disease (AD) is the fastest growing neurodegenerative disease in the world and is characterized by memory loss, dementia, and difficulty in communication. AD has two hallmark pathologies, amyloid plaques and tau tangles. In addition, Hirano bodies are observed with AD. Hirano bodies (HBs) are actin-rich inclusions that occur in the brains of patients with neurodegenerative diseases. Although the function of these pathologies is not known, tau- and beta-amyloids are linked to cell death. Mutant forms of tau are well known to contribute to cell death in diseases like Parkinsonism-linked frontotemporal tau dementia (FTDP). Hyper-phosphorylated tau increases cell death and may play a role in Alzheimer's disease as well as other tauopathies (diseases attributed to tau). Previous studies in the Fechheimer lab show that Hirano bodies dramatically reduce cell death due to hyper-phosphorylated tau. These results and the fact that tau binds well to F-actin, the main constituent of HBs, have led me to ask whether tau affects Hirano body size and formation. In my experiments, H4 astroglioma cells were transfected with CT-GFP, a construct that induces HB formation, with and without mutant or wild type tau. Cells were examined using fluorescence microscopy, and images were analyzed to compare the different actin and Hirano body structures in a cell with or without tau. I have found that different forms of tau affect Hirano body size. This study enhances our understanding of the mechanism of how Hirano bodies protect against tau-induced cell death and contributes to our understanding of neurodegenerative disease.

Characterization of *cis/trans* Phosphorylation Modes in a Eukaryotic Protein Kinase

Nakul Talathi, CURO Summer Fellow
Dr. Natarajan Kannan, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Most eukaryotic protein kinases are activated via phosphorylation of a residue in a loop called the activation loop, which allows the kinase to adapt an active conformation. Interestingly, some kinases are autophosphorylated, including the Aurora kinase, a protein involved in spindle formation. Mechanistically, autophosphorylation could be *trans,* where one molecule phosphorylates another, or *cis,*

in which the same molecule is both substrate and enzyme. In order to determine the mode of autophosphorylation in the *Aurora* kinase, wild type protein was combined in solution with a kinase dead mutant and a phospho-Aurora antibody was used to check phosphorylation of the mutant. Lack of phosphorylation on kinase dead mutant suggested that the mode of autophosphorylation is not *trans*. *Cis* autophosphorylation is characterized by the rate of reaction being concentration independent. The *cis* autophosphorylation was examined by autophosphorylation levels in two different concentrations of *lambda phosphatase* treated wild-type protein. The preliminary data suggests that the kinase undergoes *cis* autophosphorylation. The current understanding of the activation loop phosphorylation is that it is part of a signaling cascade of kinases. However, because of the similarities of the *Aurora* kinase and its phosphorylation loop to other kinases, the fact that it undergoes *cis* autophosphorylation could be indicative of some other kinases undergoing similar mechanism. This would be important in the field of cancer, because some kinases could activate themselves and cause disease. Additionally, because the *Aurora* kinase is an oncogene, this *cis* autophosphorylation could lend insight into its malfunctions.

Social Media's Effect on the Arab Spring Revolutions

Stephanie Talmadge
Dr. Leara Rhodes, Grady College of Journalism & Mass Communication

Social media has opened up a new realm of journalism, which has been particularly important for the countries of the Arab Spring Revolutions. In this study, the government overthrows in Egypt, Libya and Syria were examined to determine whether or not these events occurred before these three countries were ready to implement a more democratic form of government. "Democracy" is defined by the presence of three factors: a strong leader, free elections, and an independent media where citizens can freely exchange ideas. I hypothesize that if the countries were not ready, social media would spur protesters to action, but the following revolution would be messy and not have a clear outcome. If the countries were ready, however, I posit that the revolutions would happen quickly, involving a smooth government ousting, and have a clear outcome. Newspaper articles were retrieved from the International Herald Tribune, The Daily New Egypt, Syria Today and The Tripoli Post using the key words "social media and uprising" between January 2011 and August 2011 to produce empirical data. Ultimately, I concluded that the implementation of social media could have caused the Arab Spring Revolutions to happen before Egypt, Libya and Syria were ready to receive democracy because the outcome in all three is still unclear and no obvious leaders have emerged.

Examining the Function of O-GlcNAc in Regulating Intracellular Signaling Pathways During *Drosophila* Development

Korry Tauber, CURO Summer Fellow
Dr. Michael Tiemeyer, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

The addition and removal of O-linked N-acetylglucosamine (O-GlcNAc) at serine and threonine residues is an essential regulator of intracellular signaling pathways. Like phosphorylation, O-GlcNAc modification acts to significantly alter the function of the protein to which it is attached. There has been considerable research documenting the functional implications of phosphorylation; such as acting as a regulator of cell growth and differentiation. Contrarily, the functions of O-GlcNAc are still being discovered and relatively little attention has been paid to the involvement of O-GlcNAc in cell processes.

As with kinases and phosphatases, O-GlcNAc modification is controlled by regulated and compartmentalized enzymes; O-GlcNAc transferase (OGT) and O-GlcNAcase (OGA). Currently, it is impractical to study the function of O-GlcNAc in mammalian species because the loss of O-GlcNAc is lethal. However, the genetic tools provided by Drosophila allow us to examine the effects of increasing and decreasing O-GlcNAc levels in specific tissues. This project aims to better understand the function of O-GlcNAc by altering the expression of OGT and OGA within specific cells of *Drosophila melanogaster*. Our results indicate that diminishing the attachment of O-GlcNAc to intracellular proteins in engrailed-expressing cells reduces the amount of wingless protein the cells secrete. Coupled with previous preliminary analyses, now reproduced and optimized here, that revealed the loss of the entire posterior wing section in O-GlcNAc deficient wing discs, it is becoming increasingly clear that O-GlcNAc is essential for normal wingless signaling. Further research will aim to examine phenotypic penetrance in larval wing discs and quantify protein expression in both wing discs and embryos.

Teacher Evaluation Methods in Georgia Public Schools

Matthew Taylor
Dr. Sally Zepeda, Lifelong Education, Administration & Policy, College of Education

Students in Georgia's public schools are lagging behind the rest of the nation. According to the National Assessment of Educational Progress (NAEP), a nation-wide test of 4th and 8th graders, Georgia ranks among the bottom 15 states of the nation in reading and math. While numerous variables influence students' educational outcomes, the most important school-related factor is the quality of teachers.

In order to assess the ways in which teacher evaluation methods could be improved to increase the quality of teachers in Georgia's public schools, I reviewed relevant scholarly research and conducted interviews with education scholars and policy experts. Over the course of the research, it was discovered that the current system of Georgia Public Schools identifies very few ineffective teachers, does not incentivize good teaching, and does not have accurate information on which to base employment and compensation decisions. In addition, the value-added tests currently in place to measure teacher effectiveness are in many cases inaccurate due to the small sample size involved. In the wake of these findings, I suggest that the formation of an independent body of teacher evaluators would increase the quality of teachers by providing unbiased feedback to the teachers, as well as accurate qualitative information to be used in schools' employment and compensation decisions. These findings are important because they embody a critique of the status quo, as well as a viable alternative to it. By improving teacher evaluations, we improve the quality of teachers, and thereby give Georgia's students the education they deserve.

The Effect of Lipoic Acid on Inflammatory Cytokines and Messenger RNA Levels in Microglial Cells

Lauren Titus
Dr. Nick Filipov, Physiology & Pharmacology, College of Veterinary Medicine

Parkinson's Disease is a crippling neurodegenerative disorder, whose symptoms are caused by dopaminergic cell death in the substantia nigra. The cause(s) of this cell death is still largely unknown, but numerous studies have demonstrated that reactive oxidative species and inflammatory cytokines produced in brain microglial cells damage neighboring dopaminergic neurons, possibly by triggering apoptosis. Microglia could be activated by

multiple factors, one of them being lipopolysaccharide (LPS), an endotoxin from gram(-) bacteria. When microglia are activated by LPS, they secrete inflammatory cytokines such as TNF-a and IL-6, as well as reactive oxygen and nitrogen species. My research focuses on the anti-oxidant lipoic acid, a non-essential fatty acid able to pass through the blood-brain barrier and its anti-inflammatory effects. Because certain antioxidants also exhibit anti-inflammatory properties, I hypothesized that lipoic acid would neutralize damaging reactive oxygen species, decreasing inflammatory cytokines produced. If neuroinflammation of microglia can be reduced by lipoic acid, then, potentially, the severity of PD could be lessened. To test this hypothesis, I pre-treated microglial cells with varying amounts of lipoic acid and then activated them with LPS. I performed ELISAs and quantitative PCRs to determine how lipoic acid affects the expression and transcription of two inflammatory cytokines, TNF-a and IL-6. The results showed that lipoic acid pre-treatment decreased the expression of TNF-a and IL-6 (24hr) and that this decrease at the protein level correlated with a decrease in mRNA levels of these two cytokines, particularly TNF-a (4hr). This suggests lipoic acid decreases inflammatory cytokine transciption or mRNA stability.

Global Web Advertising: How Different Countries Regulate Digital Advertisement

Emma Torpy
Dr. Leara Rhodes, Grady College of Journalism & Mass Communications

In an increasingly globalized market, corporations and organizations are increasingly utilizing to the internet as a platform to build relationships. This process especially manifests itself in online advertising. Since the internet is a worldwide medium—it is the most efficient for a global market. The question is: Do advertisements on the web fall under different laws and jurisdictions in different countries? With so many countries, and their varied laws, able to access one site—how do we regulate and protect content? Thus far, most guidelines for digital advertising have been based on laws pertaining to print. These laws differ from country to country. For example, while in the United States advertising is regulated by the Federal Trade Commission, the United Kingdom monitors its advertising through "self regulation" (in which the industry itself decides fair practices). Yet, in Singapore, historically the emphasis has been less on protecting the consumer and more on nation-building and monitoring sensitive themes. They do not yet have a legal framework for advertising regulation (Hoy 2008). International corporations need to be aware of the differences between communication laws in countries. In this paper, we will take a brief look at the web advertising laws of the major economic powers in the world—the G8 countries. These countries—Canada, France, Germany, Italy, Japan, Russia, the United Kingdom, and the United States—are the most industrialized and thus the most likely to come in contact with each other in trade. Thus it is important for these eight to be familiar with the communication—notably advertising—law of their foreign partners. This paper hypothesizes that, although most of the globe operates by the guidelines of international organizations such as The International Chamber of Commerce or The Committee for Consumer Policy, there are significant differences that we must learn about in order to practice business properly abroad. By looking at these major countries, we can produce guidelines to help corporations plan their online advertising.

Characterization of Cone Degeneration in the Opn1.GFP Transgenic Mouse Retina

Tommaso Tosini
Dr. Jim Lauderdale, Cellular Biology, Franklin College of Arts & Sciences

Many eye diseases, particularly those with an underlying genetic cause, have no current

form of treatment. In order to develop new treatments, good animal models of human disease are required. The Opn1.GFP mouse, which has green fluorescent protein (GFP) expressed in the L/M-cone photoreceptors only, has previously been used in research into *retinitis pigmentosa* (RP) and is the focus of this research project. It has recently been reported that there is a slow decline in GFP-expressing cells, which had been attributed to GFP-mediated toxicity. Preliminary findings suggested that cell death was not limited only to GFP-expressing cells, but was also due to a global cone degeneration, perhaps due to an underlying genetic cause, as a result of insertional mutagenesis of a cone-specific gene during insertion of the Opn1.GFP transgene. To characterise this degeneration, we made retinal sections stained by immunocytochemistry (ICC) which indicated that the degeneration was not limited to L/M-cone photoreceptors but extended to S-cone photoreceptors; this was confirmed statistically by flat-mounted retina cone counts, thus suggesting an underlying genetic cause. To further investigate this, we used various PCR strategies to precisely map the insert location to investigate the effects on neighbouring genes, but they were not successful in locating the insert. This mouse is a new model of a cone-specific degeneration, useful for research into *retinitis pigmentosa*, in addition to being useful for cone survival analyses for early cone degenerations.

Manipulating Tropical Fire Ant Populations to Decrease the Coffee Berry Borer

Waring Trible III, Foundation Fellow
Dr. Ron Carroll, Odum School of Ecology

The coffee berry borer, *Hypothenemus hampei*, is the greatest pest in coffee production worldwide. Ants are the primary known predators of the coffee berry borer and some research has been conducted into which ant species are the most efficient predators. The tropical fire ant, *Solenopsis geminata*, is common throughout Central American coffee farms, but *S. geminata* is not known to be a strong predator of the coffee berry borer. We conducted an experiment in two shade farms in Costa Rica to test the hypothesis that *S. geminata* indirectly protects the coffee berry borer by suppressing populations of other ant species. Here we show that removal of *S. geminata* from a coffee plot can lead to a significant increase in the disappearance rate of coffee berry borer beetles from coffee berries on the ground over a 72 hour period compared to control plots.

Optimization of Surface-Initiated Kumada Catalyst Transfer Polycondensation

Nathan Usselman, CURO Summer Fellow
Dr. Jason Locklin, Chemistry, Franklin College of Arts & Sciences

Conjugated polymer films are capable of influencing the electrical properties of a surface, and films of these polymers have potential uses in biofuel cells, solar cells and other organic electronic devices. Surface-Initiated Kumada Catalyst Transfer Polycondensation (SI-KCTP) was developed to grow polymer films from surfaces functionalized with a reactive monolayer, a single molecule-thick layer of initiators. Repeated oxidative addition and reductive elimination of a Ni(0)/Ni(II) catalytic group in the presence of monomer initiates a chain growth polymerization from the surface. Each step of this polymerization, however, must be optimized for controllable polymer growth. Cyclic voltammetry was used to analyze the quality of monolayers constructed on indium tin oxide (ITO). These tests determined that the number of holes in monolayer coverage is substantially reduced by the addition of an annealing step to promote coupling after initial deposition. Also, cyclic voltammetry can quantify the Ni(II) groups present on the surface through the addition of a ferrocene based capping agent. Time-dependent studies into deposition conditions indicate that Ni(II)

reaches a maximum coverage density on a functionalized surface after only a few minutes in solution. These optimization steps have assisted in the consistent growth of conjugated polymer films via SI-KCTP, and further investigation may allow for additional control in the polymer growth.

An Investigation of the Role of Work Status in Relation to Company Growth

Suze Valmé,
Morgan Capps
Dr. Karl Kuhnert, Psychology, Franklin College of Arts & Sciences

The predictors of positive employee attitudes and work behaviors have long been of interest to industrial/organizational psychologists. Social exchange theory (Blau, 1964) and more recently psychological contract theory (Rousseau, 1998) suggest that employees feel obligated to reciprocate when they receive social or transactional benefits from their organizations. This research examines two aspects of satisfaction with the workplace, compensation satisfaction and communication satisfaction, which lie at either end of the psychological contract continuum, representing transactional and relational benefits respectively (Rousseau, 2001). The primary hypothesis of this study is that, when employees are satisfied with levels of compensation and communication within the organization, this obligation will impact employee's attitudes toward behaviors that grow the company. We investigate the role of work status (full-time or part-time employment) as a potential moderator of this relationship. Existing research informing the direction of the moderation is inconclusive, such that we will develop and test three alternative models. The first model suggests that full-time employees will feel a stronger obligation for growth than part time. The second model suggests that part-time employees will feel a stronger obligation for growth than full-time, while the third suggest that obligations to reciprocate will not differ between part-time and full-time employees. This study utilizes survey data collected at a large U.S. based shipping and packing company. The results from this study will enrich current understanding of the psychological contracts and extra role performance in the workplace.

Analyzing the Kinetic and Thermodynamic Properties of O-Man Initiated Glycan Binding Alpha-Dystroglycan and Laminin-2

Kishore Vedala, Foundation Fellow
Dr. Carl Bergmann, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Alpha-dystroglycan is a heavily glycosylated cell-surface protein that functions as a transmembrane linkage from the cytoskeleton to the extracellular matrix. The defective binding of alpha-dystroglycan to laminin-2 is one cause of congenital muscular dystrophy. A phosphorylated o-mannose glycan on alpha-dystroglycan is required for this binding to occur. Defects in the post-phosphoryl modification of the protein, which is mediated by multiple established and yet unknown glycosyltransferases, are what lead to the defective binding and, by extension, congenital muscular dystrophy. The exact structure of the o-man initiated glycan is not known, but it is hypothesized to have an HNK-1 capped keratan sulfate-like domain. The purpose of this study was to obtain a purified, isolated sample of the FC region of alpha-DG (DGFC4) and run a surface plasmon resonance study to determine the kinetic and thermodynamic parameters binding a DGFC4 chip to laminin, helping determine the structure. The sample was isolated utilizing the transformation of DH5-alpha cells with DGFC4 plasmid, amplification and isolation of the plasmid, transfection of HEK293T and C2C12 cells, purification of the DGFC4 protein from the cells through affinity chromatography, expression of the epitopes, and confirmation

of purification. The results showed confirmation of DGFC4 expression through the presence of bands in the 95-135 kDa region of SDS-PAGE western blots using IIH6 antibody and wFa treatment. However, analysis using silver stain and coomassie dyes showed a purity of about 80-90%. In order to further purify the protein for use in the SPR study, isoelectric focusing and subsequent ion-exchange chromatography will be used.

Methionine Sulfoxide Reductase Gene Regulation in _Vibrio fischeri_

Michael Webber
Dr. Eric Stabb, Microbiology, Franklin College of Arts & Sciences

Living cells exposed to reactive oxygen species (ROS) undergo oxidative stress, which damages macromolecules within the cell, including nucleic acids, lipids, and proteins. Cells use various strategies to diminish the harmful effects of ROS including detoxification enzymes, antioxidants, and enzymes that reduce oxidized products. *Methionine sulfoxide reductases* (*msr*'s) are repair enzymes that act on the amino acid methionine (Met) after it has been oxidatively damaged in prokaryotes and eukaryotes. *Msr*'s reverse oxidative damage by reducing the oxidized sulfur atom on Met. We are investigating transcriptional regulation of *msr* genes to better understand oxidative stress responses in bacteria and during host-microbe interactions. The bioluminescent marine bacterium *Vibrio fischeri,* which forms a mutualistic relationship with the Hawaiian bobtail squid *Euprymna scolopes*, contains three *msr* proteins encoded by three distinct genes. Transcriptional regulators of these genes were targets in this study. We created a random mutant library of *V. fischeri* using a Transposon. Then, we inserted plasmids with transcriptional fusion between each *msr* promoter and a β-galactosidase gene to identify changes in *msr* promoter activity. Future work will include identifying the site of Transposon insertion to find and characterize regulators of *msr* genes. The identification of *msr* regulators will allow us to better understand how cells respond to damage caused by oxidative stress.

Cognitive Measures, Antisaccade Performance and Obesity in Children

Abby Weinberger
Dr. Jennifer McDowell, Psychology, Franklin College of Arts & Sciences

Obesity is a rapidly increasing epidemic. Previous studies have found relationships between obesity, fitness and cognition. In children, increased obesity and decreased fitness have been associated with lower performance on tests of aptitude, achievement and executive control (EC). An ongoing study is investigating these relationships in children. Participants are 175 sedentary, overweight (BMI ≥ 85th percentile) children, 8 - 11 years old, who are tested at the Georgia Health Sciences University. Participants undergo behavioral and cognitive measures that differentially assess inhibition. The antisaccade task requires inhibition of a glance, and the flanker task requires inhibition of a response to competing stimuli. A correct antisaccade requires inhibition of a reflexive glance towards a peripheral visual cue and generation of an eye movement to its mirror image location. One type of trial assessed in this task is a trial in which the initial glance is an error but is then corrected. This measure and other behavioral inhibition measures can be correlated with well-known measures of cognition, including the Cognitive Assessment System (CAS) and Tower of London (TOL). Preliminary exploratory analyses indicate that children who correct their errors more often and more quickly have higher scores on other cognitive measures. For example, faster reaction times were associated with better performance on the CAS subscales, which have been impacted by chronic exercise in previous intervention studies. Cognitive performance was also related to measures of obesity and fitness. In sum, this study

provides important information regarding the relationship between effective inhibition and various cognitive measures.

U.S. Policy Alternatives to a Military Takeover in Egypt

Patrick Wheat
Dr. Sherry Lowrance, International Affairs, School of Public & International Affairs

Since the resignation of President Hosni Mubarak, the Supreme Council of the Armed Forces (SCAF) has led the government of the Arab Republic of Egypt. Recent actions by the SCAF have raised concern that the SCAF will not surrender power upon the conclusion of the 2012 election cycle. These conclusions were drawn as a result of the continued use of Emergency Law, the continued use of military trials on civilians and the detainment of international citizens, including citizens of the United States (U.S.). As a result of these observations, the U.S. must anticipate an attempt by the SCAF to hold on to political authority rather than transfer it to the elected officials of the new government. To plan an appropriate reaction to this event, the U.S. should consider previous military controlled governments, including the Republic of Haiti and the Republic of Poland, to chart a response. Effective options the U.S. should consider include enforcing political and economic sanctions, which may range from the reevaluation of military foreign aid, the rescindment of military weapons sales, economic sanctions and continued support for the democratic movement within the Egypt, in an attempt to transfer power from the SCAF to a democratically elected government.

Expression of Secretory Phospholipase A2 in Prostate Cancer Cells Lines.

Stephanie Wilding
Dr. Brian Cummings, Pharmaceutical & Biomedical Sciences, College of Pharmacy

Secretory phospholipase A2 (sPLA2) are calcium activated esterases that are secreted to the extracellular side of cells. Recent studies show that sPLA2 expression in prostate cancers correlates to metastasis and poor prognosis. There are several isoforms of sPLA2, which are categorized into groups (e.g. Groups I, II, III, V and X). Few reports have examined the differential expression of sPLA2 in cancer cells. Thus, we used reverse transcriptase-polymerase chain reaction (RT-PCR) and quantitative PCR (qPCR) to study the expression of sPLA2 in prostate cancer cell lines (PC-3, LNCaP and DU-145 cells). Our sPLA2 studies included Groups IB, IIA, V and X. Group IB sPLA2 was expressed in all three cell lines. Group IIA sPLA2 was detected in LNCaP and DU-145 cells, with lower levels detected in PC-3 cells. Group V sPLA2 was detected in LNCaP and PC-3 cells. In contrast, Group X sPLA2 was detected in all cells but was highest in PC-3 cells. RT-PCR does not allow for a quantitative comparison of mRNA levels between cells; therefore, we used qPCR to show that Group IB sPLA2 had higher levels of expression in PC-3 cells compared to LNCaP cells, which had higher levels of expression than DU-145 cells. Group IIA sPLA2 and Group V sPLA2 followed the same pattern of expression in all three cell lines. Group X sPLA2 expression was highest in PC-3 cells, followed by DU-145 cells, with low levels in LNCaP cells. Collectively, these results show the differential expression of sPLA2 isoforms in prostate cancer cells.

Abstracts

A Sociolinguistic Perspective on Roswell, Georgia

Anna Wilson
Dr. Bill Kretzschmar, English, Franklin College of Arts & Sciences

Where once Spanish was relegated to historically Hispanic-influenced parts of the country, it can now be heard in virtually every corner of our nation. Hispanics, or *Latinos* as they prefer to be called, have profoundly impacted the size, look, and feel of our cities. Knowing this, I began working with Dr. William Kretzschmar's *Roswell Voices* project, as well as the Roswell Convention and Visitors Bureau, in Fall 2011, in an attempt to describe the sociolinguistic experience of the Latino community of Roswell, Georgia. In order to achieve this goal, I have tried to elicit community, volunteer-based participation in a series of interviews. Entering into the Latino society of Roswell proved difficult. Thus, as a byproduct of my original research inquiry, I have collected qualitative data about the closed nature of Roswell's Latino community. These observations are pertinent to the fields of Sociolinguistics and Spanish in the United States U.S., as they provide insight into the nature of Latino communities outside the Southwestern and Northeastern U.S., and are important if we are to understand the changes taking place in Georgia's culture and for Latinos in the Southeastern U.S.

The Effect of Hypoxia on Transketolase in Breast Cancer Cells

Star Ye, CURO Summer Fellow
Dr. Jason Zastre, Pharmaceutical & Biomedical Sciences, College of Pharmacy

Due to the hypoxic microenvironment of solid tumors, breast cancer cells preferentially rely on anaerobic glycolysis for ATP generation. Paralleling the rapid growth of tumor cells, an increase in glucose uptake is one of the most recognizable phenotypic changes in cancer. Glucose is required for glycolysis and is subsequently metabolized to glucose-6-phosphate prior to entering the pentose phosphate pathway (PPP). The principal function of the PPP is to generate ribose-5-phosphate for nucleic acid synthesis and NADPH for reductive biosynthetic reactions. Within the nonoxidative branch of the PPP, the thiamine-dependent enzyme transketolase (TKT) is rate-limiting. TKT catalyzes a reaction that produces glyceraldehyde-3-phosphate and fructose-6-phosphate, which can be shunted into the glycolytic pathway. Essential for TKT activity is the enzyme cofactor thiamine pyrophosphate (TPP), produced by the conversion of thiamine by thiamine pyrophosphokinase 1 (TPK1). Our research has shown that hypoxia induces increased glucose consumption, thiamine uptake and TPK1 expression in breast cancer cells. We hypothesize that TKT activity increases with increasing expression of TPK1 in hypoxia. Preliminary results from transketolase assays show an increase in transketolase activity in hypoxic breast cancer cells. Also, RT-PCR and western blotting reveal that hypoxia does not change TKT mRNA and protein expression, suggesting that increased TKT activity may be a result of increased TPP availability. This study demonstrates the implications of thiamine in breast cancer, indicating that TPP may be a key enzyme cofactor in anaerobic cancer metabolism.

Addressing Students' Math Deficiencies in Introductory Physics with Online Scaffolded Problems

Cameron Zahedi, CURO Honors Scholar
Dr. Craig Wiegert, Physics & Astronomy, Franklin College of Arts & Sciences

Introductory physics courses are mathematically demanding, even those for non-physics science majors. Students must become adept at solving a wide variety of quantitative problems. However, even students with calculus experience often lack facility with basic pre-calculus skills. A large

contributing factor to the problem is the students' generally poor retention of working math skills, but they also struggle to transfer their math knowledge to unfamiliar problem domains. These students should benefit from early intervention that continues to scaffold throughout the term. We report on our efforts to create and evaluate math-related, online formative assessment modules for first semester introductory physics. These online tutorials target specific mathematical skills that are essential to success in physics, and are designed to progress from a purely math-centered review of each basic skill, to problems of increasing generality and complexity, and ultimately toward a transfer of these skills to physics problem domains.

Reversal of Acepromazine Sedation by Doxapram in Dogs

Mark Zapata
Dr. Erik Hofmeister, Small Animal Medicine & Surgery, College of Veterinary Medicine

Acepromazine generally produces long-lasting, mild to moderate sedation and depresses the central nervous system. Doxapram works as a non-selective central nervous system stimulant that directly works at the respiratory center in the brain stem. The purpose of this study was to evaluate the effectiveness of two doses of doxapram to reverse acepromazine sedation in dogs. Dogs were randomly assigned to one of three treatment groups. Each group was administered acepromazine followed 30 minutes later by saline solution with 1.25mg/kg doxapram or 2.50mg/kg doxapram. Sedation scores were obtained at 0, 15 and 30 minutes after acepromazine administration and at 5, 15 and 30 minutes after treatment administration. Comparison of sedation scores for all time points and groups revealed a significant correlation between use of doxapram and decreased sedation scores. Dogs were noticeably more alert and interactive after doxapram treatment. There was not a significant difference between the effects of the 1.25mg/kg dose and 2.50mg/kg doses of doxapram. This study determined doxapram to be effective in reversing the behavioral effects of acepromazine for a short period of time. We recommend a 1.25mg/kg dosage of doxapram to reverse the effects of acepromazine sedation in dogs.

Photoimmunotherapeutic Nanoparticles for Combination Therapy of Breast Cancer

Dhillon Zaver
Dr. Shanta Dhar, Chemistry, Franklin College of Arts & Sciences

Cancer is among the leading health problems in society today. Though there are several methods of treatment, the combination of photodynamic therapy, using light to activate a complex in a specific area, and immunotherapy, the activation of the host's immune system to fight the cancer, has largely remained unexplored. Thus, the effective formation of a nanoparticle based complex for the wide delivery of drug and activation of specific immune response to combat this issue is an ideal place to explore. To this end, a nanoparticle platform that has a photosensitizer to destroy localized cancer in the visible light and a dissociating dendritic cell activator to initiate an immune response against the cancer, as well as possible cancer metastasis, can be imagined. Construction of such a platform, using chemical, biological, and nanotechnology based tools and its characterization will be presented. Preliminary in vitro studies will be used to verify the potential of such a platform for cancer therapy. If this platform can be proved effective, a new alternative therapeutic option for metastatic cancer can be envisioned.

Index of Presenters and Faculty Mentors

Index of Presenters and Faculty Mentors

Index of Presenters and Faculty Mentors

Index of Presenters and Faculty Mentors

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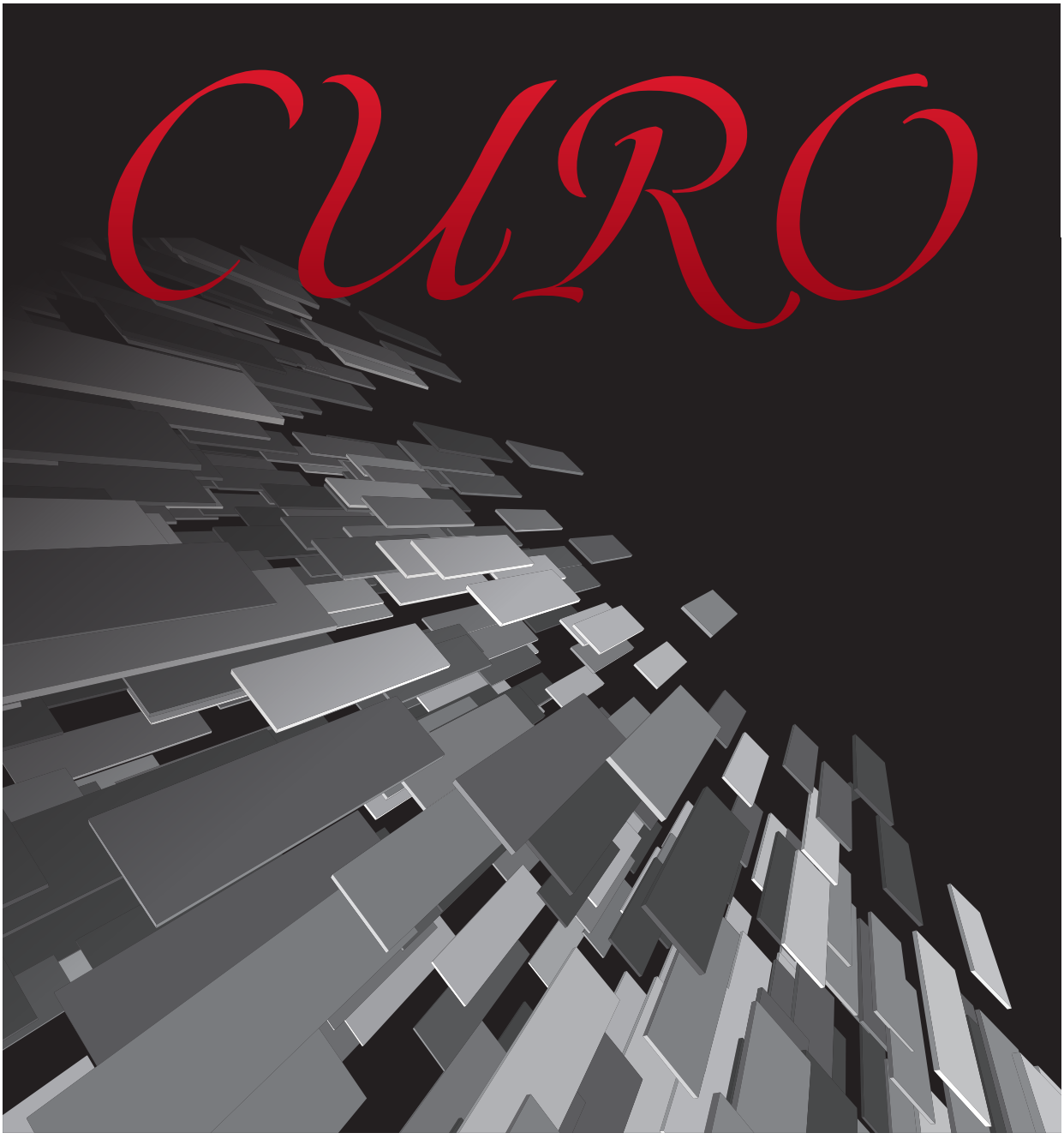

PROGRAM & ABSTRACTS

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Symposium

Program and Abstracts

CURO Office
203 Moore College
The University of Georgia
Athens, GA 30602
(706) 542-5871

http://www.curo.uga.edu

Symposium chair:	Dr. Martin P. Rogers, Associate Director of CURO and the Honors Program
Book of abstracts:	Matthew Jordan, Program Coordinator, Center for Undergraduate Research Opportunities
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Table of Contents

CURO

April 1, 2013

Dear Students, Faculty, and Guests:

Welcome to the 13th annual CURO Symposium, UGA's celebration of undergraduate research across the disciplines. Many individuals—administrators, faculty members, staff, graduate students, and, of course, undergraduates—have collaborated to make the CURO Symposium the premier undergraduate academic event at UGA.

Each year, the Symposium has grown larger, and the 2013 Symposium is the largest to date, with 211 undergraduate researchers communicating their substantial accomplishments to their peers, mentors, and the public at large.

From its inception, the CURO Symposium has showcased research and scholarship in all disciplines. The 2013 Symposium continues that commitment, featuring presenters from 51 departments in 13 colleges/schools. Thus, today evidences UGA's broad and substantial support of research, and the invaluable commitment of UGA's administration and faculty to mentoring and providing exceptional learning opportunities for our undergraduates.

Thank you for your continued support of undergraduate research and CURO.

Sincerely,

Dr. David S. Williams, '79, '82
Associate Provost and Director

Dr. Martin P. Rogers, '01, '11
Associate Director

Acknowledgements

Special Assistance for 2013 CURO Symposium

Ms. Erin Kattos	Student Worker, CURO
Ms. Dorothé Otemann	Coordinator of External Affairs, Honors Program
Ms. Amanda Pruitt	Assistant to the Director, Honors Program
Ms. Chelsea Smith	Administrative Associate, External Affairs, Honors Program
Ms. Jessica Thompson	Student Worker, CURO
Ms. Eleana Whyte	Administrative Associate, CURO

Technology Equipment and Support for 2013 CURO Symposium

Center for Teaching & Learning
College of Agricultural & Environmental Sciences
College of Education
College of Family & Consumer Sciences
Franklin College of Arts & Sciences
Honors Program
Terry College of Business

Reviewers for 2013 CURO Research Mentoring Awards

Dr. David S. Williams	Associate Provost and Director of Honors and CURO
Dr. Martin Rogers	Associate Director of Honors and CURO

Reviewers for 2013 CURO Summer Research Fellowships

Dr. Brian Cummings	Department of Pharmaceutical and Biomedical Sciences
Dr. Monica Gaughan	Department of Health Policy & Management
Dr. Timothy Hoover	Department of Microbiology
Dr. Patricia Hunt-Hurst	Department of Textiles, Merchandising, & Interiors
Dr. William Kisaalita	College of Engineering
Dr. Martin Rogers	Associate Director of Honors and CURO

Reviewers for 2013 CURO Symposium Best Paper Awards

Dr. Carl Bergmann	Department of Biochemistry & Molecular Biology
Dr. Pamela Orpinas	Department of Health Promotion & Behavior
Dr. Martin Rogers	Associate Director of Honors and CURO
Dr. Brock Tessman	Department of International Affairs

Oral Session Conveners for 2013 CURO Symposium

Ms. Lisa Bolding	Department of English
Mr. Sean Buskirk	Department of Infectious Diseases
Ms. Lindsay Coco	Honors Program
Mr. Douglas Eudy	Institute of Plant Breeding, Genetics & Genomics
Ms. Michelle Johnson	Academic Advisor, Honors Program
Ms. Teneema Kuriakose	Department of Infectious Diseases
Mr. Bill McDowell	Odum School of Ecology
Ms. Emily Myers	Administrative Associate, Foundation Fellowship Office, Honors Program
Ms. Jessica Reichard	Honors Program

Acknowledgements

Mr. Greg Roundtree	Administrative Associate, Office of Recruitment, Honors Program
Ms. Elizabeth Sassler	Honors Program
Mr. Alexander Vaughn	Department of Chemistry

Schedule

Monday, April 1, 2013

Oral Session I **9:05-9:55 a.m.**
Athena Breakout Rooms A, B, C, D, G, H, I, J

Oral Session II **10:10-11:00 a.m.**
Athena Breakout Rooms A, B, C, D, G, H

Oral Session III **11:15-12:05 p.m.**
Athena Breakout Rooms A, B, C, D, G, H, I

Oral Session IV **12:20-1:10 p.m.**
Athena Breakout Rooms A, B, C, D, G, H, I, J

Oral Session V **1:25-2:15 p.m.**
Athena Breakout Rooms A, B, C, D, G, H, I, J

Oral Session VI **2:30-3:20 p.m.**
Athena Breakout Rooms A, B, C, D, G, H, I, J

Awards and Keynote Session **4:00-5:00 p.m.**
Grand Hall Atrium (downstairs-use escalator in lobby)

Poster Session and Reception **5:00-6:00 p.m.**
Grand Hall South (downstairs-use escalator in lobby)

The 2013 CURO Symposium will conclude at 6:00 p.m.

CURO Research Mentoring Awards

The Office of the Senior Vice President for Academic Affairs and Provost and the Honors Program established the CURO Research Mentoring Awards, formerly the EURM awards, in 2001.

These awards recognize outstanding faculty who consistently make a concerted effort to engage undergraduate researchers and enhance the learning experience of undergraduates at The University of Georgia, especially through CURO. Award recipients have demonstrated superior research opportunities and mentoring programs for their undergraduate students, including outstanding teaching, supervision of undergraduate research courses and theses pursued through CURO, and collaboration on publications and presentations at professional conferences.

2013

Master Level Faculty Award

Dr. Jennifer McDowell, Department of Psychology, Franklin College of Arts & Sciences

Early Career Faculty Award

Dr. Katalin Medvedev, Department of Textiles, Merchandising & Interiors, College of Family & Consumer Sciences

2012

Master Level Faculty Award

Dr. Lawrence Shimkets, Department of Microbiology, Franklin College of Arts & Sciences

Early Career Faculty Award

Dr. Michael Yabsley, Warnell School of Forestry & Natural Resources

2011

Master Level Faculty Award

Dr. Eric Stabb, Department of Microbiology

Early Career Faculty Award

Dr. John Drake, Odum School of Ecology

Program Award

Savannah River Ecology Laboratory
Dr. Kenneth McLeod, Interim Director

2010

Early Career Faculty Award

Dr. John C. Maerz, Warnell School of Forestry & Natural Resources

2009

Early Career Faculty Award

Dr. Brian S. Cummings, Department of Pharmaceutical & Biomedical Sciences
Dr. Anna C. Karls, Department of Microbiology
Dr. Dawn T. Robinson, Department of Sociology

2008

Master Level Faculty Award

Dr. John J. Maurer, College of Veterinary Medicine

CURO Research Mentoring Awards

Early Career Faculty Award
Dr. Walter K. Schmidt, Department of Biochemistry & Molecular Biology

Program Award
Biomedical and Health Sciences Institute
Dr. Harry S. Dailey, Director

2007

Master Level Faculty Award
Dr. Timothy Hoover, Department of Microbiology
Early Career Faculty Award
Dr. Steven Stice, Department of Animal & Dairy Science

2006

Master Level Faculty Award
Dr. Patricia Hunt-Hurst, Department of Textiles, Merchandising & Interiors
Early Career Faculty Award
Dr. Rodney Mauricio, Department of Genetics
Graduate Student Award
Christopher Anderson, PhD candidate in Ecology
Graduate Student Recognition
Dawn Holligan, PhD candidate in Plant Biology

2005

Faculty Award
Dr. Gary Barrett, Odum School of Ecology
Dr. Sidney Kushner, Department of Genetics
Department Award
Department of Cellular Biology

2004

Faculty Award
Dr. William S. Kisaalita, Department of Biological & Agricultural Engineering

2003

Faculty Award
Dr. Jody Clay-Warner, Department of Sociology
Department Award
Department of Microbiology
Dr. Duncan Krause, Department Head
Dr. Timothy Hoover, Undergraduate Coordinator
Program Award
The Pratt Laboratory of Plant Genomics and Bioinformatics
Dr. Lee H. Pratt, Department of Plant Biology
Dr. Marie-Michèle Cordonnier-Pratt, Department of Plant Biology

CURO Research Mentoring Awards

2002

Faculty Award

Professor William D. Paul, Jr., Lamar Dodd School of Art
Dr. Katherine Kipp, Department of Psychology

Faculty Recognition

Dr. Susan Sanchez, College of Veterinary Medicine

Department Award

Department of Biochemistry & Molecular Biology
Dr. J. David Puett, Department Head

Program Award

"Physics Beyond the Boundaries": National Science Foundation, REU Program
Dr. Loris Magnani, Principal Investigator, Department of Physics & Astronomy
Dr. Heinz-Bernd Schuttler, Department Head, Department of Physics & Astronomy
Dr. Jonathan Arnold, Department of Genetics
Dr. Susmita Datta, Georgia State University
Dr. David Logan, Clark Atlanta University
Dr. William Steffans, Clark Atlanta University

2001

Faculty Award

Dr. Marcus Fechheimer, Department of Cellular Biology

Faculty Recognition

Dr. David MacIntosh, Department of Environmental Health Sciences
Dr. Dean Rojek, Department of Sociology

Department Award

Department of Genetics
Dr. John MacDonald, Department Head

Program Award

Savannah River Ecology Laboratory
Dr. Paul Bertsch, Director

CURO Symposium Best Paper Awards

Since 2001, CURO Symposium Best Paper Awards have recognized excellence in papers developed from work being presented at that year's Symposium.

Applicants may submit in one or more of the following categories: arts, biological sciences, civic responsibility focus, humanities, international focus, physical sciences, and social sciences.

Each recipient is recognized at the Symposium's Award and Keynote Session, and each award carries $100 in financial support, generously provided by the UGA Alumni Association. Winners from the 2013 CURO Symposium are listed below.

Arts:

Brendan Boyle	The "Darlton" Initiative: Serial Complexity, Parallel Media Narratives and Showrunner Tactics in *LOST*

Biological Sciences:

Lauren Titus	The Anti-Inflammatory Effects of Lipoic Acid on Inflammatory Cytokines

Civic Responsibility Focus:

Dalton Mark	The First Rule of Camorra Is You Do Not Talk about Camorra: An Investigation into the Rise of the Organized Crime Syndicate in Naples, Italy

Humanities:

William Prigge	"Is Black So Base a Hue?" An Examination of Aaron and Racial Dynamics in *Titus Andronicus*

International Focus:

Patrick Wheat	Justice for All: The Vitality of Addressing Judicial Structures During Reconstruction Period

Physical Sciences:

Miriam Perryman	Embodied Energy Requirements for Meat Calorie versus Non-meat Calorie Production: A Comparative Study of Nine Countries

Social Sciences:

Meghan Foley, Katryna McCann	Managers vs. Employees: The Differing Effects of Communication Strength and Supervisor Support on Work Engagement

Program

Monday, April 1, 2013

Concurrent Oral Session I: 9:05 – 9:55 a.m.
Athena Breakout Rooms A, B, C, D, G, H, I, J

Room A	**Emily Vermillion**	An Analysis of the Effect of Phytase Phosphorous Absorption and Growth in Nursery Pigs
	Brigid Burns	Anesthetic Complications in Dogs Undergoing Surgery for Liver Disease
	Steven Mathew	The Use of Scheduled Combination Treatments of Etoposide and Doxorubicin to Treat Feline Injection Site Sarcoma Cells
Room B	**John-Jordan Nunnery**	Removing Barriers to Vision Services for School Children
	Terese Gagnon	On Memory's Tidewater: Sapleo Island Documentary Project
	Christine Bassett	Popular and Folk Medicine: Towards an Understanding of the Latino Health Paradox
Room C	**Maria Cox**	When is a Kiss a Thimble? Sexuality in Adaptations of *Peter Pan* over Time
	Jared Stepp	Sitcom Technology through the Ages
	Brendan Boyle	The "Darlton" Initiative: Serial Complexity, Parallel Media Narratives and Showrunner Tactics in *LOST*
Room D	**Nicholas Ramos-Franklin**	Democratic Peace Theory: An Accurate View or Team Alliance
	Conner Blackwell	The Aversion to Condom Use in an HIV-saturated World
	Kameel Mir	Civil Society Collaboration between the U.S., E.U., and Turkey
Room G	**Kelly Tucker**	The Role of Cognitive Tasks in the Conceptualization and Assessment of ADHD
	Hania Bisat	Election Triggers: How a Sip of Water Can Ruin a Campaign

	Brett McCardel	Performance on a Saccade Task under Varying Cognitive Load
Room H	**Callan Brownfield, Robert Ashley**	Synthetic and Enzymatic Decarboxylation of Tyrosine Derivatives
	Elena James	Targeting the *Mycobacterium smegmatis* cobU Gene to Study Vitamin B12 Biosynthesis
	Lauren Titus	The Anti-inflammatory Effects of Lipoic Acid on Inflammatory Cytokines
Room I	**Dalton Mark**	From Feudalism to Democracy: Using Political Philosophy to Reframe Traditional Distinctions between the Great Ages of Europe
	Dalton Mark	The First Rule of Camorra is You Do Not Talk about Camorra: An Investigation into the Rise of the Organized Crime Syndicate in Naples, Italy
	Kangkyu Lee	Rekindling the Hermit Kingdom
Room J	**Brittany Truitt**	Determining a Method for Pharmacologic Rescue of Mutations that Affect Tissue-specific Glycan Expression in *Drosophila melanogaster*
	Mathew Joseph	Autophagic Responses in the Murine Model of Placental Malaria
	Nicholas Richwagen	Algae Biomass Production Using Compost Leachate Water and Evaluation of Biomass Harvesting Techniques

Concurrent Oral Session II: 10:10 – 11:00 a.m.
Athena Breakout Rooms A, B, C, D, G, H

Room A	**Michelle Norris**	*Dormant*: A Photographic Series
	Samuel Smith	Multiple Marlows: Intertextuality and Irony in Conrad's Marlow Tales
	Jacqueline Van De Velde	A Critical Examination of Anglicanism in the Life of Laurence Sterne and Its Implications within *Tristram Shandy*

Room B	**Chelsea Sexton**	*Pseudo-nitzschia* in the Diet of *Paraprionospio pinnata*, a Polychaete in the Gulf of Mexico Hypoxic Zone: Potential Mechanism for Toxin Bioaccumulation
	Na Hyung Choi	The Origin of Unusual Phosphate Deposits on the Venezuelan Island of Gran Roque, Leeward Antilles
	Ian Karra	Developing a Sustainability Policy for the University System of Georgia
Room C	**Peter Melampy**	Components of Economic Freedom and the Institutional Approach to Economic Growth
	Colin Dungu	Analyzing Linkages between Economic Development Models and Food Security: Comparative Case Study of Thailand, Vietnam, and the Philippines
Room D	**Katherine Arnold**	Music, Metaphorical Language, and Expanding Thought Networks in Shelley's "To a Skylark"
	Fiona Sheehan	The Unpublished Letters of Elizabeth Bishop
	Daniel LoPilato	Mapping Narrative: The Structure and Composition of a Short Story Cycle
Room G	**Ashton Garner**	Compensatory Exercise and Thinness Expectancies
	Jake Moskowitz	Occupational Complexity as a Predictor of Cognitive Reserve
	David Parker	Understanding the "Gap" Effect in the Generation of Express Saccades
Room H	**Patrick Wheat**	Justice for All: The Vitality of Addressing Judicial Structures during Reconstruction Period
	Terese Gagnon	Landscapes of the Interior: Ethnobotany and Sense of Place among Karen Refugees
	Aveek Sarker	Chinese Foreign Direct Investment in the United States: A New Game

Concurrent Oral Session III: 11:15 – 12:05 p.m.
Athena Breakout Rooms A, B, C, D, G, H, I

Room A	**Hannah Klevesahl**	Fanny Kemble: A Juliet of a Different Era

	Gloria Kim	The Birth of Metrosexuality in South Korea
	Margaret Touchton	The Women of *Richard III* Revisited
Room B	**Elijah Staggers**	The Black Youth Vote in the 2012 Presidential Election: Disillusioned or Reenergized?
	Madison Lamar	Grandparenting from the Dump
	Emily Peng	Increasing Access to Specialty Services in Community Health Centers: Policy Alternatives and Implications for Minority Communities
Room C	**McKinley Alden**	German Inalienable Possession Constructions
	Minh Ngoc Nguyen	Vietnamese Language Attitudes, Use, and Identity: Determining a "Fobby" Vowel Quality
Room D	**Melinda Johnson**	Drug and Mental Health Courts in Georgia's Criminal Justice System
	Aditya Aphale	The Relationship between Dynamic Postural Stability Index Composite Scores and Talar Tilt Average Scores
	Carol Conroy	Exploring the Use of Comprehensive Nutrition Education Programs as a Means of Reducing Food Insecurity in Georgia
Room G	**Todd Pierson**	Traditional and Environmental DNA Detection of a Rare Amphibian
	Ridwan Mahbub	Development of a PCR-based Marker to Identify Overwintering Sites for *Exobasidium* sp. on Blueberries in Georgia
	Cameron Prybol	Discover Life Mothing Project
Room H	**Krista Ritchie**	Identifying Possible Roles for Structural Proteins in Thymus Morphogenesis
	Travis Williams, Jr.	Comparison of Two Biocatalysts for Ethanol Production from Pectin-rich Biomass with Varying Levels of Industrial Processing
Room I	**Rebekah Myrick**	Three Dimensional Cell Based Assay Standard for Pharmaceutical Testing

	Natalie Levey	Pharmacological Manipulation of the Neuromuscular Junction between Stem Cell Derived C2C12 Muscle Cells and Motor Neurons

Concurrent Oral Session IV: 12:20 – 1:10 p.m.
Athena Breakout Rooms A, B, C, D, G, H, I, J

Room A	**Ashley Thompson**	There's Another Side to the Story: Examining the Blacklist Resulting in the HUAC Hearings of the 1950s
	William Murdock, Jr.	Story-gathering and Community Performance
	Emily Hoskins, Dakota Nesbitt	Converting Culture: Relating 19th Century Women's Dress to a 1960s Society
Room B	**Matt Burns**	Where a Kid Can Be a Kid, Even When She's an Adult – The Internet's Role in Sustaining Engagement with Children's Television
	Adam Samples	The Epistle of James: Discovering Its Conception of Faith and Works and Its Call for Social Justice
	Charles Hicks	How the White Protestant Church Should Respond to Issues Affecting Lesbian, Gay, Bisexual, and Transgender People
Room C	**William Austin II**	Groundwater in Sub-Saharan Africa
	Amelia Watson	Navigating Sickle Cell Disease in Africa
Room D	**Dervin Cunningham**	Proteomic Analysis of the Tomato/*Botrytis cineria* Interaction
	Alexandra Auger	Evaluation of Live Virally-vectored Vaccine for Malaria in Murine Model
	Savannah Pena	Lipid Association Improves Hemoglobin-binding Capacity by Haptoglobin Related Protein
Room H	**Savannah Colbert**	Democratic Dialogue: Comparing Presidential Debate Content and User-generated Comments in Online News
	Mackenzie McRae	Policy Analysis: US-Afghanistan Reconstruction Efforts
	Kirstie Hostetter	Affordable Housing in a Poverty-stricken Community

Room I	**Emily Stubbs**	For the Love of God: Damien Hirst and a Room with a Corpse
	Joanna Caffrey	The Excommunication of Early Jewish Christians and Its Interpretive Value for the So-called Temple Cleansing in the Gospel of John
	Lindsay Ullrich	Major Clarity in a Minor Paradox: The Role of Mark 9:24 in Illuminating the Markan Conception of Faith in the Context of Discipleship
Room J	**Katherine Hsieh**	Relationship between Approximate Entropy and Dynamic Postural Stability in Ankle Instability
	Phillip Ogea	Classification of Protein-ligand Interactions of *P-glycoprotein*

Concurrent Oral Session V: 1:25 – 2:15 p.m.
Athena Breakout Rooms A, B, C, D, G, H, I, J

Room A	**Richard Gardiner**	The Death of the Death Penalty
	Travis Miller	Trade-offs: The Effects of Contiguous Rivalries on International Decision-making
	Jinny Park	Leading from Behind: A Progressive Outlook on U.S.-North Korean Relations
Room B	**Alexandra Prather**	The Few. The Proud. The Marines.
	Jeanette Kazmierczak	Pervasiveness of Science News in First-world Countries vs. in Emerging Economic Powerhouses
	Olivia Gorbatkin	Science Lecture Classrooms: Extending the Bounds of Creative Teaching and Learning
Room C	**Carley Borrelli**	Examination of Age as a Moderator of the Relationship between Sleep Quality and Job Satisfaction
	Sarah Evans	Comparison of an Embedded Effort Measure on CNS Vital Signs between Older and Younger Adults
	Rachel Callery	Vocal Intonation as a Social Referencing Cue in Infants and African Grey Parrots

Program

Room D	**Theresa Stratmann**	Developing Methods to Locate and Survey for Rare Species: a Case Study Using the Endangered Bog Turtle (*Glyptemys muhlenbergii*)
	Brent Zurcher	Understanding Ecological Networks: A Mathematical Approach to Ecosystem Balancing and Analysis
	Victoria Staples	Body Size and Temperature: A Report on Moth Activity in Clarke County
Room G	**Zachary Holmes**	Top-down Control by Bonnethead Sharks in Oyster Reef Communities through Consumptive and Non-consumptive Effects
	Kelly Murray	Investigating the Indirect Effects of Guppy Introduction on Populations of a Shredding Caddisfly in Trinidadian Streams
	Megan Sheehan	Effects of the Amazon River Plume on Subsurface Waters: Measuring the Effectiveness of the Plume's Uptake of Atmospheric CO_2
Room H	**Grant Moody**	Conformational Preferences of a Prototype Biomolecule in Liquid Helium Nanodroplets
	Kasey Darley	A Therapeutic Nanoparticle Platform for Ischemic Brain Injury
	Richard Weimar III	Where Chemistry Meets the Classics: First-ever Modern Scientific Analysis of Pompeiian Polychrome Sculptures
Room I	**Eilidh Geddes**	Teacher Cheating Scandals in Georgia and Possible Policy Solutions
	Jesse Chan	Increasing Georgian Household Participation in the Banking System
	Mugdha Joshi, Alex Edquist	Academic Steroids: The Need to Control Adderall Abuse on University Campuses
Room J	**Stephanie Wilding**	Investigation of the Mechanism of Bile Acid-induced Prostate Cancer Cell Death
	Courtni Young	Relationship between Number of Years in Animal Health Practice and Recognizing Pain

	Torre Lavelle	Transforming Animal Shelters into a Service-based Economy

Concurrent Oral Session VI: 2:30 – 3:20 p.m.
Athena Breakout Rooms A, B, C, D, E, G, H, I, J

Room A	**Samantha Frigerio, Elijah White**	Water Loss Tates of Two Terrestrial Salamanders, *Plethodon shermani* and *Plethodon teyahalee*, and Their Hybrids
	Scott Saunders	The Future of Lyme Disease: Virulence Determined by Climate
	Joyce Huang	The Prevalence of Salmonella Infection in Various Southeastern Wild Aquatic Turtles and Captive Painted Turtles (*Chrysemys picta*)
Room B	**Philip Grayeski**	Cell Cycle Gating of the Mammalian Sonic Hedgehog Signaling Pathway
	Alyse Ragauskas	Extending Genetic Methods to Members of the Genus *Caldicellulosiruptor*: Use for Metabolic Engineering Biofuel Production from Biomass
	Jennifer Pallansch	Characterization of the Light Signaling System in Fireflies
Room C	**Tuan Nguyen**	Structural Evolution of the Ca_2^+/Calmodulin Dependent Protein Kinase
	Cole Skinner	Characterization of an RNA-protein Immune Complex Functioning in Prokaryotic Viral Defense
	Michelle Mackenzie	Cope's Gray Treefrog's Preference to Occupy Different Colors of Artificial Refugia
Room D	**Hope Foskey**	Identification of GABA-responsive Neurons in the Zebrafish Brain
	Conner Blackwell	Striated Fiber Assemblin in Tetrahymena
	Stephen Bocarro	The Overexpression of Long Flagella Protein 4 in *Tetrahymena thermophila*
Room E	**Allison Gantz**	"Pretty What?"— An Exploration of Society and Gender through Movement

Program

Room G	**William Willoughby IV**	The Role of Technology in Early North American Pacific Colonialism
	Christina Azahar	Perspectives on Postnationalism in Chilean *nueva canción*
	Rachel Pérez	The Fever for Progress: Yellow Fever in 19th and 20th Century Havana and Savannah
Room H	**Alisa Zezetko**	Mikhail Bulgakov's Mysteries: The Personas, Metaphors, and Names of the Novel *The Master and Margarita* Analyzed in a Historical Context
	Anna Wilson	Stories of Roswell, Georgia: A Sociolinguistic Study of Narrative Structure
	Jacqueline Van De Velde	Crossing the Threshold: British Integration Policy through Haifa Zangana's *Women on a Journey Between Baghdad and London*
Room I	**William Prigge**	Is Black So Base a Hue? An Examination of Aaron and Racial Dynamics in *Titus Andronicus*
	Brittany McGrue	The Need for Universal Design: An Environmental Assessment of Residential Interior Spaces and the Built Environment
	Amy Moulton	Stepping into Masculinity: The Dress and Body Modification of African American Fraternities
Room J	**Lily Kim**	What Differentiates Certain Salmonella Serovars from Others in Their Ability to Cause Human Illnesses?
	Julia McElreath	Development of Avian Infectious Bronchitis Virus-like Particles
	Smitha Ganeshan	Access Care

4:00 p.m. Awards and Keynote Session
Grand Hall Atrium (downstairs - use the escalator in the lobby)

Welcome and Introductions	Dr. David S. Williams, Associate Provost and Director, Honors Program
Remarks	Professor Jere W. Morehead, Senior Vice President for Academic Affairs and Provost

Program

Introduction to Awards	Dr. Martin Rogers, Associate Director of CURO & Honors
CURO Research Mentoring Awards	Dr. David C. Lee, Vice President for Research
2013 Symposium Best Paper Awards	Dr. Laura Jolly, Vice President for Instruction Ms. Deborah Dietzler, Executive Director, Alumni Association
UGA Libraries' Research Awards	Ms. Caroline Barratt, Director, Miller Learning Center Library Commons
Introduction of Keynote Speaker	Ms. Maria Cox, Foundation Fellow '14, English
Keynote Address	Dr. Fran Teague, Meigs and University Professor of Theatre and English "The Lavish Elegance of Research"
Closing Comments	Dr. David S. Williams, Associate Provost and Director, Honors Program

5:00 p.m. Poster Presentations
Grand Hall South (downstairs - use the escalator in the lobby)

Poster #1	**Tiffany Cauthen**	Classifying the Legitimacy of Malicious Domains for Safer Internet Browsing
Poster #2	**Elliot Outland**	Finite-difference Time-domain Investigations of Metamaterials
Poster # 3	**Samuel Kennedy**	Mitochondria Targeted Delivery of Cisplatin Prodrugs
Poster # 4	**John Harper**	Anoxic Transition within the Smoky Hill Chalk Member of the Niobrara Formation and its Effect on Organic and Inorganic C-N Assemblages
Poster # 5	**Abigail Maxwell**	Comparison of Crustal Chemical Composition of the Carolina Terrane and Inner Piedmont using Vp/Vs Ratios Obtained from Broadband Seismic Data
Poster # 6	**Abigail Saenger**	Melt Inclusion Study of the East Fork Rhyolite Member of the Valles Caldera, New Mexico
Poster # 7	**Samantha Frigerio**, **Elijah White**	Water loss Rates of Two Terrestrial Salamanders, *Plethodon shermani* and *Plethodon teyahalee*, and Their Hybrids

Poster # 8	**Matthew Knull**	Trout Angler Awareness of the Hemlock Wooly Adelgid and Its Effect on Trout Habitat and the Available Treatment Methods
Poster #9	**Lara Mengak**	"Why Is There an Alligator in My Pool?" Assessing Potential Range Shifts with Sea Level Rise
Poster # 10	**Megan Sheehan**	Effects of the Amazon River Plume on Subsurface Waters: Measuring the Effectiveness of the Plume's Uptake of Atmospheric CO_2
Poster # 11	**Heather Abernathy**	A Disease Ecology Project Without the Disease: A Survey of Trichnonomiasis in House Finches in Athens, GA
Poster # 12	**Melanie Fratto**	A Testosterone Tale: Do Females Really Have Higher Levels than Males?
Poster # 13	**Zachary Holmes**	Top-down Control by Bonnethead Sharks in Oyster Reef Communities through Consumptive and Non-consumptive Effects
Poster # 14	**Chelsea Sexton**	Pseudo-nitzschia in the Diet of *Paraprionospio pinnata*, a Polychaete in the Gulf of Mexico Hypoxic Zone: Potential Mechanism for Toxin Bioaccumulation
Poster # 15	**Delaney Kolich**	A Comparison of the Effectiveness of Plant DNA Extraction Methods against Two Common Secondary Metabolites
Poster # 16	**J. Taylor Bellamy**	Effect of Muscadine and Concord Grape Juice Phenolics on the Oxidation of LDL
Poster # 17	**Hannah Harrison**	Epigenetic Pathways and Glutamate Transporters in Neuropathic Pain
Poster # 18	**Katie Tuggle**	Differential Expression of RGS Proteins during Neural Differentiation
Poster # 19	**Stephanie Wilding**	Investigation of the Mechanism of Bile Acid-induced Prostate Cancer Cell Death
Poster # 20	**Star Ye**	The Effect of Thiamine Supplementation on Transketolase Activity in Cancer Cells
Poster # 21	**Kevin Cown**	Second Law of Thermodynamics Efficiency Analyses of High-voltage Electricity Transmission

Poster # 22	**Rebekah Myrick**	Three Dimensional Cell Based Assay Standard for Pharmaceutical Testing
Poster # 23	**Miriam Perryman**	Embodied Energy Requirements for Meat Calorie Versus Non-meat Calorie Production: A Comparative Study of Nine Countries
Poster # 24	**Dillon Davis**	Topology of the Ras Converting Enzyme
Poster # 25	**Elizabeth Guarisco**	Examination of the Link between Glycosaminoglycans and Pectins
Poster #26	**Matthew Hess**	The Role of Lipid Fluidity in the Assembly of Trypanosome Lytic Factor
Poster # 27	**Kaitlin Hufstetler**	*In vivo* and *In vitro* Analyses of the Human Insulin-degrading Enzyme Reveal That the Yeast A-factor Mating Pheromone Can Serve as a Universal Substrate for M16A Family Proteases
Poster # 28	**Robert MacDonell**, **Dillon Davis**, **William Saunders III**, **Kaitlin Hufstetler**, **Colby Ruiz**	Study on the Ste24p Zinc Binding Motif, Ste24p Substrate Loading Mechanism, and Archae Ste24p Homologs
Poster # 29	**William Saunders III**, **Colby Ruiz**	Non-canonical CaaX Motifs Can Drive Protein Isoprenylation
Poster # 30	**Tuan Nguyen**	Structural Evolution of the Ca_2^+/Calmodulin Dependent Protein Kinase
Poster # 31	**Collin Shumate**	Searching for the Minimal Segment of Alpha Toxin Necessary for Binding to GPI-Anchored Proteins on Cancer Cells
Poster # 32	**Tram Van**	Purification of Periostin for Future Protein Screening Assays
Poster # 33	**Addison Wright**	Clarification of the Mechanism of *Aliivibrio fischeri* HutW, a Class C Radical SAM Methyltransferase Enzyme
Poster # 34	**Jay Dasigi**	Trinucleotide Insertion and Deletion in TgTPC1 cDNA
Poster # 35	**Connor Sweetnam**	The Characterization of F-actin/34kDa Binding Sites and Their Contribution to the Formation of Model Hirano Bodies

Poster # 36	**Dabin Ji**	Effect of Different Pheromones on the Transcriptional Activator LuxR in *Vibrio fischeri*
Poster # 37	**Kiana Nezafat**	Characterizing a Novel Intragenic RpoN-dependent Promoter in Salmonella
Poster # 38	**Babajide Oluwadare**	Analysis of P1 Function in *Mycoplasma pneumoniae* Adherence and gGliding
Poster # 39	**Travis Williams, Jr.**	Comparison of Two Biocatalysts for Ethanol Production from Pectin-rich Biomass with Varying Levels of Industrial Processing
Poster # 40	**Philip Grayeski**	Cell Cycle Gating of the Mammalian Sonic Hedgehog Signaling Pathway
Poster # 41	**Devon Humphreys**	Resolving Species Relationships When Reproductive Barriers Are Incomplete: A Case Study in Drosophila
Poster # 42	**Kyungmin Ko**	Key to Thrive as Larvae: Cross-fostering Analysis between Two Species of Burying Beetles, *Nicrophorus vespilloides* and *Nicrophorus orbicollis*
Poster # 43	**Katharine Korunes**	Annotation of the Sarcocystis Neurona Genome – Challenges and Lessons Learned
Poster # 44	**Alyse Ragauskas**	Extending Genetic Methods to Members of the Genus Caldicellulosiruptor: Use for Metabolic Engineering Biofuel Production from Biomass
Poster # 45	**Krista Ritchie**	Identifying Possible Roles for Structural Proteins in Thymus Morphogenesis
Poster # 46	**Simone Lalvani**, **Lauren Cobb**	Influence of Weight Distribution on Biomechanics of Performance Horses
Poster # 47	**Emily Vermillion**	An Analysis of the Effect of Phytase Phosphorous Absorption and Growth in Nursery Pigs
Poster # 48	**Mina Ghobrial**	Assessing the Role of Soluble TNF Receptors I and II in Placental Malaria
Poster # 49	**Adam Michalak**	Early Development of Benzimidazole Resistant *H. contortus* within Individual Sheep

Poster # 50	**Stephen Scott**	Using Next Generation Sequencing to Identify Unique Sequence Types associated with Gravidity-based Immunity in Placental Malaria
Poster # 51	**Batare Okivie**	An Assessment of Neutrophil Enrichment by Single Step Differential Density Separation
Poster # 52	**Devon Wochele**	Serum Free Cortisol Fraction and Insulin Concentration in Normal Horses, Obese Horses and Horses with Pituitary Pars Intermedia Dysfunction
Poster # 53	**Elizabeth Beadles**	Expression of PECAM in EHD
Poster # 54	**Yun Ho**	Development of an Immunohistochemical Technique to Detect *Burkholderia mallei* in Horse Tissues
Poster # 55	**Spencer Mitchell**	Expression of Toll-like Receptor-3 in Response to EHDV
Poster # 56	**Ronke Olowojesiku**	Transmission Strategies of *Trypanosoma cruzi* in Wild Reservoir Hosts
Poster # 57	**Lauren Titus**	The Anti-inflammatory Effects of Lipoic Acid on Inflammatory Cytokines
Poster #58	**Michelle Uzor**	Mechanism of Gap Junction Inhibitor Carbenoxolene (CBX) in Regulating Gap Junction Proteins in ECC-1 Cells
Poster #59	**Lily Kim**	What Differentiates Certain Salmonella Serovars from Others in Their Ability to Cause Human Illnesses?
Poster #60	**Parveen Dhillon**, **Kanan Talathi**	Effects of Electrical Stimulation Intensity on the Non-Invasive Evaluation of Mitochondrial Function Using Near-Infrared Spectroscopy
Poster #61	**Alexandra Ely**	Text Messaging: A Tool to Increase Physical Activity Compliance?
Poster #62	**Ryan Guilbault**	Reliability and Validity Study of an Accelerometer-based Approach to Estimate Free-living Energy Expenditure
Poster #63	**Jane Jurma**, **Stephanie Tan**, **Graham Mercier**	The Influence of Muscle Heme Concentration on Optical Measurements of Mitochondrial Capacity
Poster #64	**Hania Bisat**	Election Triggers: How a Sip of Water Can Ruin a Campaign
Poster #65	**Lindsay Ives**	Higher Education and Future Planning

Poster #66	**Shelby Devine**, **Kelsey Hardy**, **Katelyn Briggs**	The Relationship between Communication and Satisfaction with Change Management with Supervisor Trust as a Moderator
Poster #67	**Meghan Foley**, **Katryna McCann**	Managers vs. Employees: The Differing Effects of Communication Strength and Supervisor Support on Work Engagement
Poster #68	**Ashton Garner**	Compensatory Exercise and Thinness Expectancies
Poster #69	**Amanda Heaton**, **Amy Cohen**	Target Training: Is It an Effective Method for Enriching the Lives of Captive Capuchin Monkeys?
Poster #70	**Anakela Popp**	Examining the Rates of Development of Manipulation and Nut Cracking Skills in Juvenile Bearded Capuchin Monkeys
Poster #71	**Stephanie Villarreal**	Capuchin Monkeys and Emotional Contagion: Displaying Affiliation towards Humans Who Imitate Them
Poster #72	**Graham Levitas**, **Isabel Cohen**, **Brittany Saraga**	Parental Meta-emotion Philosophy as It Relates to Child Emotional Functioning
Poster #73	**Heather Patterson**	Children's Emotional Awareness: Relations to Emotion Regulation and Coping in Middle Childhood
Poster #74	**Lane Siedor**	Self-control in the Workplace: The Relationships between Self-control and Perceived Task Difficulty
Poster #75	**Alixanna Burg**	Developing a Nutrition Intervention Program for College Female Freshmen Using Social Media
Poster #76	**Arielle Weekley**	Associations between BMI and Folate Status of Normal Weight and Obese Women of Childbearing Age
Poster #77	**Kathryn Bridges**	Spousal Healthcare Disparities between LGBTQ Federal Employees and Their Heterosexual Coworkers
Poster #78	**Elijah Staggers**	The Black Youth Vote in the 2012 Presidential Election: Disillusioned or Reenergized?
Poster #79	**Savannah Colbert**	Democratic Dialogue: Comparing Presidential Debate Content and User-generated Comments in Online News
Poster #80	**Sara De La Torre Berón**	The Ordinance of 1669 in Application on the Grande Maîtrise de Toulouse as Documented by Louis de Froidour

Poster #81 **Kylie Wagner** Effective Organization of Complex Visual Information

Abstracts

A Disease Ecology Project without the Disease: A Survey of Trichomoniasis in House Finches in Athens, GA

Heather Abernathy
Dr. Andy Davis, Odum School of Ecology

Trichomoniasis is an infection caused by the protozoan *Trichomonas gallinae* and is known around the world to cause morbidity and mortality in columbiform species and birds of prey (Bondurant and Honigberg 1994). It is now believed that the infection is spreading in North America and primarily affects members of the finch family (Fringillidae). In this study we captured and sampled house finches for the presence of *Trichomonas gallinae* in the Athens, GA area. We used two methods to detect the parasite: wet-mounts and commercial kits designed to culture Trichomonid parasites. We sampled a total of 34 house finches, and of these, 9 birds had visible signs of mycoplasmal conjunctivitis. We did not detect *T. gallinae* in any of the birds, which indicates it is not present in this area, or that birds with the disease are removed from the mobile population.

German Inalienable Possession Constructions

McKinley Alden
Dr. Vera Lee-Schoenfeld, Germanic & Slavic Studies, Franklin College of Arts & Sciences

In German, possessive constructions with inalienable prepositional phrase-embedded objects yield either an accusative- or dative-marked possessor. The construction in question is defined by the seemingly random interchangeability of the accusative and dative case, for example, "Der Junge hat ihn/ihm in die Nase gebissen" ("The boy has him-*Acc/Dat* in the nose bitten" or, less literally, "The boy bit him in the nose"). Previous studies suggest that degree of affectedness was the direct cause of this apparent equivalence of case— namely, that a more heavily affected object will be taken in the accusative case (Draye 1996, Lamiroy and Delbecque 1998). However, a lack of reliable objective quantification of affectedness and the inability of this theory to explain examples when parts of speech not directly present in the construction change degree of affectedness— for example, adjectives "increasing" affectedness do not change case marking— show that this established idea cannot be true. Here we take the position that the ability to use either case is dependent on the presence of verb-specified directed motion, the endpoint being a goal prepositional phrase. A combination of corpus search, interview, and survey will be used on subjects who were either born, raised, or currently reside in Germany, or speak the language as their mother tongue. This methodology should yield results that will, when superimposed on preordained German case laws, generate valuable syntactic information and aid in the further construction of German grammar.

The Relationship between Dynamic Postural Stability Index Composite Scores and Talar Tilt Average Scores

Aditya Aphale
Dr. Cathleen Brown Crowell, Kinesiology, College of Education

In the United States, about 25,000 lateral ankle sprains occur per day, with 74% of those afflicted developing chronic ankle instability (CAI). Increased mechanical laxity, or looseness, of the ankle ligaments may influence the development of CAI, as can deficits in postural stability. These two constructs may interact to increase severity of CAI. The purpose of this study was to determine whether there was a correlation between Dynamic Postural Stability Index (DPSI) composite scores and talar tilt scores. Seventy-eight recreationally active college-aged participants completed a forward hop onto a single leg and balanced on a force plate. Participants also had talar tilt measured using the instrumented LigMaster device, which applies a known inversion force to the

ankle and calculates resultant tilt in degrees. Pearson R correlations were calculated for talar tilt and DPSI composite scores. There was no significant correlation between the variables, (R= 0.10, p=0.37). Ankle ligament laxity does not appear related to DPSI composite score, indicating these are two distinct constructs. Future studies should correlate medial-lateral postural stability indices to talar tilt, since the ankle's ligaments protect it from medial-lateral instability during a jump in the same direction as talar tilt.

Music, Metaphorical Language, and Expanding Thought Networks in Shelley's "To a Skylark"

Katherine Arnold
Dr. Casie Legette, English, Franklin College of Arts & Sciences

Percy Shelley was a Romantic poet and literary figure interested in the sources of a poet's creativity and the inner processes of the imagination. He developed his ideas in a poem, "To a Skylark," in which he invokes music as a metaphor for inspiration. Through the metaphors and metre of language, the poem attempts to affect the reader's thought pattern in a manner similar to the musical forms composed concurrently by Felix Mendelssohn. This paper examines sources in musical criticism, literary criticism, and cognitive science in order to identify the similarities in Shelley's and Mendelssohn's works. Specifically, Mendelssohn's musical forms interact with a listener's working memory and rely on the listener to develop a musical theme across movements of a composition. This interaction relates to the cognitive processes pertaining to metaphors like those created in Shelley's poem. Both artists, responding to the intellectual movements of subjectivity and organicism, created works that convey a unity of thought while resulting in a thematic transformation across a piece. Placing Shelley's poem in a medium both literary and musical allows for a new interpretation and understanding of the poem's abstract images and sources of energy in relation to the reader's cognitive process.

Evaluation of Live Virally-Vectored Vaccine for Malaria in Murine Model

Alexandra Auger
Dr. Julie Moore, Infectious Diseases, College of Veterinary Medicine

Malaria is a vector borne infectious disease common in tropical regions caused by *Plasmodium falciparum*. Nearly a million people, the majority children, die from the disease each year. The majority of cases occur in developing nations where prophylaxis medications and treatments may be too costly or difficult to administer. Despite the great need, no effective vaccine is currently available. This study evaluates the effectiveness of a live viral vector vaccine administered intranasally. MSP 4 and 5 are merozoite surface proteins that were chosen to target infection and incorporated into the parainfluenza virus, PIV5. In the current experiment, ten mice were administered the vaccine, ten mice received only the vector without MSP 4 and 5, and ten mice received PBS as a control. The thirty mice were then infected with 10^3 *Plasmodium Berghei* ANKA, which parallels human malarial infection, to evaluate the effectiveness of the vaccine. The mice were monitored daily for anemia, parasitemia levels, weight loss, behavioral changes, and development of cerebral malaria. All but one of the vaccinated mice succumbed to cerebral malaria by day eight of infection. Currently, the antibody response of the vaccinated mice is being evaluated through immunofluorescence assay. Although the vaccine did not prevent fatality, the vector may still be useful with a different antigen if an antibody response is present. More research is needed to determine if the vaccine has the potential to be effective against malaria.

Abstracts

Groundwater in Sub-Saharan Africa
William Austin II, CURO Summer Fellow
Dr. William Kisaalita, College of Engineering

Global warming and climate change have greatly impacted small-scale farmers in Sub-Saharan Africa. The continent's populations traditionally relied upon groundwater. Groundwater has very slow natural replenishment rates, inevitably causing continental water tables to sink as water sources are exhausted. The declining water tables have led towards even faster climatic change for various regions, particularly East Africa. New practices are slowly being adopted within Sub-Saharan Africa. We collected field data in Tanzania to measure the adverse effects of the changing climate on small-scale farmers while analyzing and promoting alternatives to combat the negative environmental outcomes. Much of the data was collected in an effort to decrease dependence on ground water through sustainable sources—primarily rain catchments and water storage tanks. We were able to calculate the additional energy placed into an environment through the utilization of roof catchments. Additionally, we are analyzing the benefits of small-scale conservation agriculture to trap water within the soil, preventing environmental degradation. Our research has confirmed that small-scale farmers are at the mercy of changing weather patterns and that the adverse effects can be overcome through a shift away from groundwater towards alternative sources of water. If stronger affirmative action is not adopted in the near future, mass water shortages will likely become magnified.

Perspectives on Postnationalism in Chilean *Nueva Canción*
Christina Azahar, CURO Honors Scholar, CURO Graduation Distinction
Dr. Susan Thomas, Hugh Hodgson School of Music

The Chilean *nueva canción* movement provides in its rich artistic innovation and far-reaching sociopolitical influence a unique opportunity to examine the theories and questions of postnational musical scholarship. This paper uses the framework of Ignacio Corona and Alejandro L. Madrid's book *Postnational Musical Identities: Cultural Production, Distribution, and Consumption in a Globalized Scenario* to study *nueva canción*'s role in the formation of Chilean nationalist identity. The authors argue that "the invention of narratives of tradition, heritage, and myth" to construct a nationalist identity is an essential component of postnational scholarship, and in the context of Chile in the late 1960s and 1970s, these narratives were invented largely through the cosmopolitan practices of prominent *nueva canción* figures such as Violeta Parra and Victor Jara. Both artists used genres and traditions from a wide variety of marginalized cultures throughout Latin America to inform their socially conscious musical output. This cosmopolitan perspective on social and cultural issues, as well as the movement's national and international political affiliations, caused Chilean *nueva canción* to play a major role in the construction of pan-Latin American identity – ultimately making it transcend classification within the nation-state of Chile. Violeta Parra's early ties with Andean folkloric-popular music in Argentina and France, Victor Jara's move towards nationalism and political activism, and Luis Advis's innovative *Cantata Santa María de Iquique* are each demonstrated in this study to be a response to the postnational condition of Chile and Latin America as a whole.

Abstracts

Popular and Folk Medicine: Towards an Understanding of the Latino Health Paradox

Christine Bassett
Dr. Susan Tanner, Anthropology, Franklin College of Arts & Sciences

Social science and anthropology recognize that local perceptions, social expectations, and behavior shape human health. The Latino health paradox references an epidemiological phenomenon where Latino immigrants, despite low socioeconomic status, exhibit good health outcomes while second generation Latinos with similar socioeconomic status experience deteriorating health outcomes. Research indicates that a loss of cultural knowledge associated with migration facilitates these outcomes. This study proposes that traditional medical knowledge serves as a buffer to environmental stressors and, in its absence, produces differential health outcomes in Latino communities. Data was collected using qualitative methods, largely structured and semi-structured interviews, with women living in Georgia who self-identified as Mexican. Interviews on topics related to maternal and child health were conducted in Spanish or English, transcribed, translated if necessary, and analyzed to identify key themes on health care practices. Results indicate that Mexican migrants integrate both biomedical and traditional remedies into their healthcare regimen. Results also imply that social networks, primarily family, serve as a vital source of health-related information. Finally, the study suggests a need for more intense research that would seek to recognize if higher reliance on traditional medical knowledge produces differential health outcomes compared to those who predominantly access biomedical healthcare strategies. A deeper understanding of the Latino health paradox would assist in transitioning towards a more holistic, individualized healthcare system and consequently facilitate better health outcomes in migrant communities.

Expression of PECAM in EHD

Elizabeth Beadles
Dr. Elizabeth Howerth, Pathology, College of Veterinary Medicine

Epizootic hemorrhagic disease (EHD), caused by a midge-transmitted orbivirus, is the most prevalent and often fatal infectious disease of white-tailed deer in the United States. The causative virus, epizootic hemorrhagic disease virus (EHDV), infects and destroys endothelial cells lining the microvasculature causing hemorrhage, but this destruction curiously elicits very little inflammation. Failure to elicit an inflammatory response may allow the virus to spread within the microvasculature and may help explain why infection is often fatal. CD31 (PECAM) is a cell adhesion molecule that plays a fundamental role in maintaining homeostasis in blood vessels through the transport of white blood cells into and out of the cell and is found on the surface and around intercellular junctions of endothelial cells. We hypothesize that low baseline levels of PECAM, or its destruction or impairment by viral infection, is partially responsible for the susceptibility of deer to EHDV. Our objective was to develop methods to quantitate expression of PECAM in deer (both normal and EHDV infected) in order to determine its specific role and/or any correlation between its expression and the disease. We have developed and are standardizing an immunohistochemical technique to quantify PECAM protein and a rtPCR technique to evaluate its mRNA in deer tissues. These techniques will allow us to evaluate PECAM expression in a wide range of tissues from normal and EHDV infected deer in order to address our hypothesis. Our findings may also help explain the pathogenesis of certain viral hemorrhagic diseases of humans.

Abstracts

Effect of Muscadine and Concord Grape Juice Phenolics on the Oxidation of LDL

J. Taylor Bellamy
Dr. Phillip Greenspan, Pharmaceutical & Biomedical Sciences, College of Pharmacy

The oxidation of LDL is an important contributor to the pathogenesis of atherosclerosis and heart disease. In this disease state, oxidized LDL is thought to promote both the accumulation of cholesterol in macrophages and the recruitment of immune cells into the atherosclerotic plaque. One intervention that may preclude the accumulation of atherosclerotic plaque and therefore arrest the development of heart disease is the dietary consumption of antioxidant foods. Muscadine and Concord grape juices contain significant amounts of phenolic compounds known to have substantial antioxidant effects. To analyze and compare the effect of these grape juices on LDL oxidation, a model system of LDL oxidation was employed using cupric sulfate, a transition metal. The amount of oxidation was determined by measuring the formation of lipid oxidized products employing the TBARS (thiobarbituric acid reactive substances) assay. At equal phenolic concentrations of 10 and 25 μg phenolics/mL (concentrations less than 5% v/v), the Concord grape samples exhibited substantial inhibition of oxidation while the muscadine grape samples were not effective. At equivalent antioxidant capacities, the muscadine grape samples again failed to inhibit LDL oxidation; Concord grape samples at the same concentration demonstrated significant inhibition. However, at a 5% (v/v) concentration, muscadine juice did inhibit LDL oxidation. While the presence of significant amounts of polyphenolics in muscadine grapes would suggest an ability to inhibit LDL oxidation in vitro, these experiments demonstrate that muscadine juice is a relatively ineffective inhibitor of LDL oxidation. Further research will analyze the specific constituents found in muscadine juice and examine whether any of them possess pro-oxidative properties.

Election Triggers: How a Sip of Water Can Ruin a Campaign

Hania Bisat
Dr. Leonard Martin, Psychology, Franklin College of Arts & Sciences

Sometimes, candidates for political office rise or fall in popularity based on seemingly insignificant events (e.g., Mark Rubio taking a sip of water during his speech). Other times, they remain popular no matter what happens to them (e.g., Clinton, Reagan). We wanted to understand why. We presented participants with brief descriptions of five fictitious candidates and asked them to rank order the candidates in terms of preference. Then, we presented them with additional information about their first and third choice candidates. This information came in the form of news stories, or "triggers," covering succeeding weeks of the campaign. Participants evaluated the candidates after each set of stories. For the last story, participants read that either their first or third choice candidate had referred to his constituents as hillbillies (questioning the candidate's electability) or had ignored his sick mother to stay on the campaign trail (questioning the candidate's values). We submitted the participants' ratings to a 2 X 2 X 2 repeated measures ANOVA (1st or 3rd choice candidate X electability or values trigger X Week 1 and Week 2). Preliminary analysis suggested that although participants gave higher ratings for their first vs. third choice candidate both initially and after the negative trigger, only their opinion of their first choice candidate dropped significantly. Also, the effect of the values-related trigger was stronger than the trigger pertaining to electability. These findings could be useful to campaign managers as they try to help their candidates cope with events that could derail their candidacy.

Abstracts

The Aversion to Condom Use in an HIV-Saturated World

Conner Blackwell, CURO Summer Fellow
Dr. Darius Ornston, International Affairs, School of Public & International Affairs

The Human Immunodeficiency Virus (HIV) has grown to become a pandemic since its first diagnosis in 1981. Since then, the virus has become a plague in the impoverished world. In Tanzania, the focus of this research, 3.3% of the population is living with the virus, but in some regions, the rate climbs to 16%. On the other hand, only .4% of Americans are currently living with HIV. The only way to prevent the transmission of the virus while remaining sexually active is through the use of a condom. However, the Tanzanian government reports "low and inconsistent" condom use despite its large sex education and condom distribution campaigns. What societal factor is holding Tanzanians from using condoms? My research aimed to expel all possible differences between America (90% of sexually-active Americans report having used a condom) and Tanzania that could explain the discrepancy in condom use in order to find a singular factor that unified all of the effects through one over-arching cause. Through analysis of HIV reports from the World Health Organization and UNAIDS, and by utilizing anthropological observations from fieldwork in Tanzania, I have concluded that this over-arching factor blocking condom proliferation is gender inequality. By recognizing the cause, it becomes easier to locate a solution to the low condom use.

Striated-Fiber Assemblin in Tetrahymena

Conner Blackwell, CURO Summer Fellow
Dr. Boris Striepen, Cellular Biology, Franklin College of Arts & Sciences

Prior research into the role of the Striated-Fiber Assemblin (SFA) protein has shown that it plays an essential role in the placement of Micro-tubule Organizing Centers (MTOC). In some organisms, this has totally depleted the possibility of reproduction. To confirm these previous findings, we have extended the study into Tetrahymena, a ciliate protozoan whose cilia grow from MTOC's that are similar to the ones from previous studies. We hypothesized that knocking out the SFA protein would disrupt the placement of MTOC's and thus immobilize the organisms. The knock-out comes from recombination of a plasmid that we construct containing Neomyacin resistance instead of coding for the SFA protein. The successful transformations will survive on a Neomyacin-coated plate and will be qualitatively studied for loss of cilia or loss of function. These results are not yet available due to the time it takes to construct the plasmid. If the SFA protein performs the hypothesized function, it will be a drug target for such diseases as malaria, cryptosporidosis, and toxoplasmis.

The Overexpression of Long Flagella Protein 4 in *Tetrahymena thermophila*

Stephen Bocarro, CURO Summer Fellow
Dr. Jacek Gaertig, Cellular Biology, Franklin College of Arts & Sciences

Microtubules mediate the majority of the movements of organelles in eukaryotic cells. One of the organelles in cells that microtubules directly mediate the movement of is the cilium. Studies in *Chlamydomonas reinhardtii* have shown that the Long Flagella protein 4(LF4) is a negative regulator of cilia length. Using a GFP tag, LF4-GFP was overexpressed in the protist, *Tetrahymena thermophila,* and shown to also negatively regulate cilia length in a pathway similar to that of Intraflagella transport (IFT) mutants. IFT proteins work in complexes near the axoneme, the base of the cilium in the main cell body. Due to the similarity between IFT and LF4 mutants, it can be elucidated that LF4 works as an inhibitor of cilia elongation and possibly of the IFT complex. By comparing the rate of growth of growing versus starved cells, we were able to establish

that the turnover rate of proteins transcending the cilia is being affected by the overexpression of LF4. We went on to establish a time at which LF4 had stopped movement in *Tetrahymena* cells while the cells still retained some length in their cilia. This would show that LF4 is affecting the turnover rate in cilia and actively stopping their movement.

Examination of Age as a Moderator of the Relationship between Sleep Quality and Job Satisfaction

Carley Borrelli
Dr. Lillian Eby, Psychology, Franklin College of Arts & Sciences

Prior studies have indicated that sleep loss results in decreased overall mood (Blagrove & Akehurst, 2001; Mastin et al., 2005). By extension, spillover theory (Staines, 1980) predicts that poor sleep quality may likewise predict lower job satisfaction. The current study examines this relationship. Moreover, existing studies have not examined how factors such as age affect the relationship between sleep quality and affective reactions, such as job satisfaction. One body of research has shown that the effectiveness of the circulatory system declines with age, resulting in lower core body temperature and disrupted sleep at night (Patlak, 2005). The purpose of this study is to determine how age moderates the relationship between sleep quality and job satisfaction. This study includes data collected from 1054 counselors from substance abuse treatment centers across the United States. The results showed that while age (B=.061, p <.045) and sleep quality (B=.203, p<.00) are negatively related to job satisfaction, age does not moderate the relationship between sleep and job satisfaction (F Change = 16.43, n.s.). Therefore, the study does not support the hypothesis that the relationship between sleep and job satisfaction is moderated by age. This research helps to develop a better understanding of the relationship between sleep, job satisfaction, and age.

Carley N. Borrelli, Hannah B. Spell, Ph.D., Lillian T. Eby, Ph.D. & Jessica L. Muilenberg, Ph.D.

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The "Darlton" Initiative: Serial Complexity, Parallel Media Narratives, and Showrunner Tactics in *LOST*

Brendan Boyle
Dr. Horace Newcomb, Grady College of Journalism & Mass Communication

ABC's *LOST* was a rare success for network television that drew a wide and enthusiastic audience for six seasons despite a complex narrative involving one of primetime's largest acting ensembles, high-concept science fiction storytelling, and weekly episodic structure that built in regular trips back and forward in time. Showrunners Damon Lindelof and Carlton Cuse, who acted as head writers and executive producers throughout the series' run, helped fans engage with the show's complexity through the creation of their own media personalities. An examination of their appearances on panels at events like Comic-Con and their official podcast, as well as the industrial circumstances surrounding the showrunners' decision to fix the series' end date in advance, grants a greater understanding of how Cuse and Lindelof were able to use the complexity of the narrative to engage with fans both as part of a larger

public relations exercise and a way to achieve greater influence in dealings with network executives. This case study works as a paradigmatic example of how television's new breed of creative-executives gain power within existing management structures during a period of upheaval in the traditional network model, a synthesis of two roles in the production process at a level of exposure which may never be repeated.

Spousal Healthcare Disparities between LGBTQ Federal Employees and Their Heterosexual Coworkers

Kathryn Bridges
Dr. Meghan Skira, Economics, Terry College of Business

This presentation will highlight the methodologies and findings of my current research project focused on spousal healthcare disparities between LGBTQ federal employees and their heterosexual coworkers. This research seeks to predict and analyze the costs that federal LGBTQ employees must incur to cover spouses' healthcare. While their heterosexual counterparts can either opt into a federal plan for their spouse or receive a tax break on the dollar amount that they contribute toward an insurance plan, LGBTQ individuals, even when legally married, do not get this benefit as a result of Section 3 of the Defense of Marriage Act (DOMA). First, I seek to use the 2012 Federal Employee Viewpoint Survey (FEVS) to identify the number of LGBTQ employees currently working in the federal government. From here, I will seek to address health concerns faced by LGBTQ individuals, specifically highlighting the costs of purchasing private market individual plans for spouses. Lastly, I seek to estimate a lump sum that this coverage costs LGBTQ families ever year, and discuss the strain that puts on families, as well as the economic effect it would have on the government if they chose to provide benefits. This estimate will be based largely in current court cases addressing this disparity, including plaintiffs in "Pederson v. OPM," set to be heard by the Supreme Court in March. In addition, the study situates this disparity within larger current federal legislation concerning lesbian and gay individuals' marriage and domestic partnership rights.

Synthetic and Enzymatic Decarboxylation of Tyrosine Derivatives

Callan Brownfield, Robert Ashley
Dr. Richard Morrison, Chemistry, Franklin College of Arts & Sciences

L-DOPA, a derivative of the amino acid tyrosine, is converted to the neurotransmitter dopamine in the human body by the DOPA decarboxylase enzyme. Extant laboratory methods for comparable decarboxylations are laborious, inefficient, and few in number. We describe the development of a microwave-promoted method to accomplish a high yield and facile decarboxylation of L-DOPA and other amino acid precursors to their corresponding amines. The amino acid or amino acid derivative is placed in a glass microwave vessel along with a catalyst in a methanol solution, and refluxed until no visible amino acid remains. Upon completion, the catalyst can then be completely recovered from the reaction. Amines are purified by simple extraction and isolated as HCl salts of the desired neurotransmitters. The method is general for most natural amino acids and for all tyrosine derivatives that were studied. Recent research involves efforts to determine if structurally similar tyrosine derivatives can be converted to their respective amines enzymatically by DOPA decarboxylase. As potential drug targets, these compounds could theoretically be delivered in amino acid form and decarboxylated to the corresponding amine in vivo. Future research efforts entail analysis of the bioactivity of unnatural derivatives of the amino acid tyrosine. HPLC comparison of the enzyme digests to the synthetic amine standards will reveal the

general efficacy of our synthetic methodology.

Developing a Nutrition Intervention Program for College Female Freshmen Using Social Media

Alixanna Burg
Dr. Rebecca Mullis, Foods & Nutrition, College of Family & Consumer Sciences

For many college freshmen this is the first time they have been solely responsible for their nutritional well-being. However, many of them have little knowledge of nutrition and healthy eating habits, making it difficult for them to navigate the myriad of food choices within a busy academic and social schedule. This study investigated whether having easily accessible and relevant nutrition information during the first year of college helped increase healthy eating habits. A focus group was conducted and ten topics were identified for the intervention to address. A social media intervention was developed using a blog to post the content of the nutrition lessons. The blog was then linked to a Facebook group that reminded participants to view the lessons. A pre- and post-test were administered online to ten study participants to measure their improvement in both knowledge and behavior. Results showed that five out of six participants who completed at least one of the blog lessons improved their overall knowledge and behavior score. Topics that showed improvement in knowledge included dining hall symbols (17.5% increase) and food labels (10% increase), and topics that showed improvement in behavior changes included dining hall information (20% increase), dietary guideline requirements (18.8% increase), and eating out (43% increase). Though the results from this study are limited by a small sample size, they show the potential that a nutrition intervention using social media can improve access to and use of reliable nutrition information for college freshmen. Further study using a larger sample size is recommended.

Anesthetic Complications in Dogs Undergoing Surgery for Liver Disease

Brigid Burns
Dr. Erik Hofmeister, Small Animal Medicine & Surgery, College of Veterinary Medicine

A dog with ongoing biliary disease may undergo a surgical procedure called a cholecystectomy, in which the gallbladder is completely removed. In the authors' clinical experience, patients with gallbladder disease tend to have a higher incidence of complications during anesthesia, including hypotension during manipulation of the gallbladder or following cholecystectomy. The purpose of this retrospective case-control study is to determine if there is a difference in the incidence of anesthetic complications between dogs with hepatic disease undergoing cholecystectomy compared to dogs undergoing other types of hepatic surgery. The hypothesis was that dogs that receive cholecystectomies would suffer a greater number of anesthesia complications than dogs that do not undergo cholecystectomy. By analyzing the medical records of dogs that underwent exploratory laparotomy for surgical management of liver disease at the UGA Small Animal Teaching Hospital, it was found that dogs that had cholecystectomy had longer anesthesia durations and longer surgery durations than dogs that did not have cholecystectomy. No significant differences existed for temperature nadir (94.6 vs 95.6 ºF; non-cholecystectomy vs cholecystectomy), final temperature (96.1 vs 96.7 ºF), time to extubation (29.5 vs 48.9 min), duration of hypotension (26.8 vs 20.8 min), or blood pressure nadir (53.3 vs 51.4 mmHg). Hypotension occurred in 66% and 74% and inotropes were used in 64% and 53%, for non-cholecystectomy and cholecystectomy patients, respectively. Dogs undergoing liver surgery for cholecystectomy did not suffer a greater number of anesthesia complications than dogs without cholecystectomies.

Abstracts

Where a Kid Can Be a Kid, Even When She's an Adult - The Internet's Role in Sustaining Engagement with Children's Television

Matt Burns
Dr. Alison Alexander, Grady College of Journalism & Mass Communication

For years, programming models insisted that children's television series aired 65 episodes, re-ran for a few years, and then disappeared into the recesses of viewers' memories. Now online video streaming allows nearly any television episode ever produced to be viewed instantly at any time, and social media outlets encourage users to share, discuss, and demand this content. With several media corporations currently riding a wave of nostalgia by reviving children's television franchises from the 1990s, this research sought to discover how and why college students are engaging with children's television, and if this sustained engagement can impact the ways media companies consider their programs' lifespans. This article reports the findings of an online survey (n = 332) that assessed methods and motivations, as categorized by Askwith (2007), that college students reported for engaging with children's television. Engagement with children's television in college is common (69%), but students are unlikely to pay for the content. Traditional television broadcasts remain an essential component of a show's longevity. Drawing from Uses and Gratifications Theory, respondents' motivations for viewing children's television in adulthood revealed three unique factors labeled Entertainment, Nostalgia, and "Closeted Masters." At a small but significant level, childhood engagement with children's television predicted adult engagement. More specifically, students who as children played in imaginary worlds, called paracosms, based on children's television were much more likely to sustain their engagement as adults.

The Excommunication of Early Jewish Christians and Its Interpretive Value for the So-called Temple Cleansing in the Gospel of John

Joanna Caffrey
Dr. Wayne Coppins, Religion, Franklin College of Arts & Sciences

The alleged excommunication of early Jewish Christians from the synagogue and the mention of such a phenomenon in John chapter nine most notably, as well as in other passages in the Gospel of John, has long been and continues to be an extensively debated topic in Johannine studies. Each occurrence of such a reference contains key words that are consistently connected either directly or indirectly to this expulsion when they occur in the Fourth Gospel, with the previously assumed exception of the use of the word "*ekballo*" in chapter two of the Gospel of John. This research proposes that the presence of "*ekballo*" in chapter two should not be seen as an exception, but rather as a purposeful reference to the subsequently mentioned excommunication, and therefore as an interpretive tool for the literary understanding of the so-called temple cleansing. The methodology involves examination of literary and historical aspects of the primary text in question. The significance of this research is that it will provide new information concerning the manner in which the author of the Gospel of John responded to conflicts between early Jewish Christians and Jews outside of the Christian movement.

Vocal Intonation as a Social Referencing Cue in Infants and African Grey Parrots

Rachel Callery
Dr. Dorothy Fragaszy, Psychology, Franklin College of Arts & Sciences

The proposed comparative study will investigate social referencing capabilities in 12- and 16-months old infants, as well as speech-using African Grey parrots. A choice

paradigm involving intonation cues and pairs of baited containers will be used. The experimenter will glance first into one container and then the other while vocalizing a high-rising (positive), low-falling (negative), or monotone (neutral) sound. The two containers will then be presented, and the preference (i.e., container first explored) recorded. We predict the 12-months age group will demonstrate no container preference, needing more experience with referential associations in order to use the cues. By 16 months, however, infants readily use caregiver affect, facial expressions, and pointing to assess novel objects. This older group should therefore explore positive intonation containers more often than negative or monotone containers. Further, we will investigate the preference patterns of speech-using African Greys, which are attentive to their caregivers' vocalizations and so may use intonation as a cue. Data collection is currently underway. This study will show for the first time whether the ability to use intonation as a social-referencing cue (1) appears in a nonhuman, and (2) develops in humans around the same time as other social referencing cues.

Classifying the Legitimacy of Malicious Domains for Safer Internet Browsing

Tiffany Cauthen
Dr. Roberto Perdisci, Computer Science, Franklin College of Arts & Sciences

In this project, we aim to detect malicious domains by leveraging search engines to collect a sense of Internet sentiment about domain names. Domain names conveniently allow Internet users to browse the Internet using easy-to-remember alphanumeric strings rather than the numeric IP addresses browsers need to connect to the right web server. Unfortunately, attackers also use domain names to steal from and infect users. These attackers transmit data, control bots, and facilitate other malevolent actions against Internet users, usually registering under false credentials. Our hypothesis is that collective Internet knowledge about a domain name will appear differently, depending on whether the domain name is used for malicious or legitimate purposes. For example, consider domain name *d* as a keyword. We collect information on which websites refer to *d* and, based on the results, perform the classification. Although current anti-malware programs have their own malicious content databases and other network-security research explores alternative ways to classify malevolent sources, our research hopes this previously unexplored method will prove probabilistically advantageous as an additional method of malicious domain name classification and provide valuable insight into how attackers create their criminal networks. We can currently classify domain names with an accuracy of about 87%. Malicious domain names are growing exponentially and continue to cause harm on unsuspecting victims. Our research hopes to create a way to accurately determine the legitimacy of domain names to impede the efforts of attackers and speed the process of warning Internet users of these malevolent domain names.

Increasing Georgian Household Participation in the Banking System

Jesse Chan, Foundation Fellow
Dr. John Campbell, J.M. Tull School of Accounting, Terry College of Business

Checking and savings accounts are conveniences many U.S. households exercise to meet their financial needs; these accounts are used to receive wages and salaries, pay utility and telephone bills, and are vehicles for saving funds for future events. A 2011 FDIC study indicated that 8.2% of all U.S. households were unbanked and 20.1% of households were underbanked. Unbanked households can least afford the pricey alternative financial services they consume, and their exclusion from the traditional banking system puts them at a severe financial disadvantage in developing savings. This

paper assessed policy alternatives to alleviate the problems and symptoms related to a high level of unbanked and underbanked households in Georgia: 1) maintaining the status quo, 2) supporting the creation of locally-focused financial literacy programs, 3) increased pricing transparency for financial services from all providers, and 4) regulating the order in which financial institutions process transactions for retail checking accounts. Each policy alternative was evaluated based on its ability to achieve three goals: 1) improve awareness of banking services, 2) improve confidence with conducting banking transactions, and 3) ultimately reducing the number of unbanked and underbanked households. After evaluation, the recommended proposed policy to help bring more unbanked and underbanked households into the mainstream banking system is support of financial literacy programs. Challenges of implementation include its relative difficulty to scale, funding challenges, and its approach to unbanked and underbanked levels through education, an indirect approach to solving the issue of unbanked and underbanked households in the United States and Georgia.

The Origin of Unusual Phosphate Deposits on the Venezuelan Island of Gran Roque, Leeward Antilles

Na Hyung Choi
Dr. James Wright, Geology, Franklin College of Arts & Sciences

The Leeward Antilles island of Gran Roque contains phosphate deposits that replaced the rinds of spheroidally weathered gabbro. The mineralogy and geochronology of the deposits were studied in order to interpret their origin. X-ray diffraction results indicate that the deposits consist principally of phosphate minerals variscite, phosphosiderite, and strengite. The island's mafic bedrock has been interpreted as an exposure of the Caribbean Plate, which formed in the Late Cretaceous when oceanic plateau magmatism thickened Pacific oceanic crust. The petrography, geochemistry, and age (87.0 ± 4.1 Ma) of the mafic complex are similar to those of other exposures of the Caribbean Plate, including the nearby islands of Aruba and Curaçao. The upper constraint for the age of the phosphates is given by the quartz diorite (65.6 ± 1.4 Ma) and pegmatite (65.3 ± 0.91 Ma) that intrude and postdate the phosphatized mafic complex. U-Pb dating of zircons from the pegmatite was carried out by laser ablation inductively coupled plasma mass spectrometry. The intrusions themselves are not phosphatized, demonstrating phosphate formation between ca 87 Ma and 65 Ma. This time period is consistent with the periods of subaerial weathering as documented for the Caribbean Plate exposures on Aruba and Curaçao. We interpret that the rinds of phosphate formed when rainwater leached guano deposits and reacted with the weathered mafic complex, resulting in the unusual suite of phosphate minerals. Similar modern processes have been observed and described from other localities, but to our knowledge this is the oldest well-documented example.

Democratic Dialogue: Comparing Presidential Debate Content and User-Generated Comments in Online News

Savannah Colbert
Dr. Bryan Reber, Grady College of Journalism & Mass Communication

Will there be common themes between the material candidates discuss in the presidential debates and the discussion about the debates by online news respondents? Using content analysis of presidential debate transcripts and online user-generated comments (UGC) about the debates, frames and themes were identified by two coders. The stratified random sample of 1,600 UGC was developed from comments following six articles about the 2012 presidential debates. To avoid skews in the data, one historically conservative newspaper (*The Wall Street Journal*, N = 1,111)

and one historically liberal paper (*The New York Times*, N = 489) were sampled for UGC following each of the three 2012 presidential debates. Based on a pretest, debate and UGC contents appear to be remarkably different. Most UGC express a strong opinion about a candidate while the debate content focuses on specific issues facing the U.S. It is further anticipated that user-generated comments about the presidential debates will be more partisan than the debates themselves, which will focus more on national issues and solutions or policies. UGC provide an important forum for citizens to voice their opinions as political participants in their democracy. Furthermore, the media is increasingly reliant on UGC to spur interest in news content. All the information used in the study was publicly posted or broadcast information, so there are no ethical issues in this content analysis study.

Exploring the Use of Comprehensive Nutrition Education Programs as a Means of Addressing Food Insecurity in Georgia

Carol Conroy
Dr. Jung Sun Lee, Foods & Nutrition, College of Family & Consumer Sciences

Food insecurity persists as one of the most pressing public health issues in Georgia. As defined by the United States Department of Agriculture (USDA), food insecurity suggests that an individual or family either consistently or periodically does not have access to enough food to lead a healthy, active life. In Georgia, approximately 16.9 percent of households experience food insecurity. The Supplemental Nutrition Assistance Program (SNAP) is the most broad federal food assistance program, benefitting approximately 45.8 million people in the United States. This program is coupled with an optional nutrition education initiative, SNAP Education Program (SNAP-Ed), which promotes the adoption of healthy eating habits and an active lifestyle as a means of preventing obesity and chronic illness. The education program is funded through the SNAP-Ed grant and can be administered to Cooperative Extension Services at any land grant university (LGU). The University of Georgia is the only LGU in Georgia and operates nutrition education programs in county offices across the state. Although the Cooperative Extension currently offers education services to all populations through the Expanded Food and Nutrition Education Program (EPNEP), it does not receive SNAP-Ed funding and therefore cannot adequately serve all SNAP beneficiaries. This paper evaluates current policy failures as well as proposes policy alternatives. By reapplying for the SNAP-Ed grant in addition to its existing grant funding, the Cooperative Extension will have an opportunity to extend services to a broader population of SNAP recipients and provide a more comprehensive nutrition education program for the state.

Second Law of Thermodynamics Efficiency Analyses of High-voltage Electricity Transmission

Kevin Cown
Dr. John Schramski, College of Engineering

The objective of this research is to determine the feasibility of conducting a second law of thermodynamics efficiency analysis of high-voltage electricity transmission. The efforts are to use exergy in conjunction with a second law efficiency. This will be done in addition to a first law of thermodynamics efficiency analysis. It is anticipated that the results of this analysis will reveal valuable insight concerning electricity transmission that is not commonly understood. The experimental model consists of an arbitrary section of high-voltage transmission cable with associated energy input and output. Quantification of this energy flow is not entirely understood at this point, and literature search for related study that may provide further knowledge is ongoing. This research is based on input-output analysis of the closed system under investigation. The goal is to reach a conclusion that could be environmentally

beneficial. Electricity transmission lines are the conveyance systems by which electrical power is distributed to the user from the generation site. Electricity generation has negative environmental consequences including coal combustion emissions, nuclear wastes, and increasing infrastructure real estate demands. Transmission losses of this environmentally expensive, high-quality energy could be further reduced with system designs based upon theoretical models derived from second law analyses.

When is a Kiss a Thimble? Sexuality in Adaptations of *Peter Pan* Over Time

Maria Cox, CURO Honors Scholar, Foundation Fellow
Dr. Fran Teague, Theatre & Film Studies, Franklin College of Arts & Sciences

The character of Peter Pan first took the stage in 1904 and has become a symbol of eternal youth, leading Wendy Darling and her brothers to Never Land, a paradise of pirates, Indians, and adventurous Lost Boys. In Barrie's treatise on childhood, Wendy learns through her adventures in Never Land that she must grow up, but before she even learns to fly, she tries to give her new friend Peter a kiss. Yet Peter, the boy who has no parents, does not know what a "kiss" is. Thinking a kiss is an object, he holds out his hand, leading Wendy to give him a thimble instead. With this gesture Barrie addresses childhood romance, Wendy's transition to adolescent sexuality, and the importance of love. A kiss can represent the rewards of maturity, and when it is eliminated, so too are the positive aspects of adulthood. Barrie expanded on these themes in his novelization of the tale, *Peter and Wendy* in 1911. This novel by Barrie is the most fully realized version of *Peter Pan*. How this scene is cut, changed, or reproduced in over a century of film adaptations shows a growing interest in these themes of love and romance. How the adaptations address them allows the viewer to think about the original in a new way. My research shows that the live-action *Peter Pan* (2003) is the most faithful adaptation of the novel, encompassing the thematic elements of "The Kiss" most effectively. This project uses materials from the University of Georgia Libraries' Peabody Collection.

Proteomic Analysis of the Tomato/ *Botrytis cineria* Interaction

Dervin Cunningham, CURO Honors Scholar, CURO Summer Fellow
Dr. Carl Bergmann, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Botrytis cinerea attributes to the post-harvest rot of more than 200 species of fruits and vegetables. As these produce ripen, their cellular wall drastically degrades, making them more susceptible to pathogens. Significant protein-protein interactions occur between the necrotrophic fungal pathogen, *Botrytis cinerea*, and the tomato fruit. By describing host and pathogen proteomes simultaneously in infected tissues, the plant proteins that provide resistance and allow susceptibility and the pathogen proteins that promote colonization and facilitate quiescence can be identified. This study is aimed to characterize the fruit and fungal proteins occurring in the tomato/*B. cinerea* interaction using shotgun proteomics. Mature green, red ripe, wild type and *rin* and *nor* mutant tomato fruit were infected with *B. cinerea* B05.10. After 5 days the infected tomatoes were gently agitated in a 1.5M NaCl solution followed by a SDS and heat treatment to collect solubilized proteins. The collected proteins were separated on a one dimensional SDS-PAGE gel, followed by in-gel digestion. Peptides were then analyzed by LC-MS/MS on a linear ion trap mass spectrometer. Data was searched using Mascot algorithm. Proteins were identified by combining the *B. cinerea* BO5.10 (Broad Institute, MA), and T4 databases (Genoscope, France) with a tomato protein database (SOL Genomics Network, Cornell University, NY). A decoy database was constructed by

reversing the sequences in this target database. Statistically significant proteins were determined at a 1% protein FDR. The composition of the collected proteins populations and their putative functions allow for a better understanding of the plant-pathogen interaction mechanism.

A Therapeutic Nanoparticle Platform for Ischemic Brain Injury

Kasey Darley
Dr. Shanta Dhar, Chemistry, Franklin College of Arts & Sciences

Stroke is the number one cause of long-term disability and the third leading cause of death in the United States. Despite a concerted effort by medical and research communities to develop therapeutics, there are few treatments and no cure. Neuro-protectants such as mitochondria acting antioxidants that shield the brain from cytotoxic effects caused by stroke have shown significant promise in rodent stroke models, but by themselves have not translated to a viable treatment in human patients. One limitation of antioxidant treatments is that they offer little in the way of tissue regeneration, which would lead to the re-growth of lost neural networks and recovery of cognitive, sensory and motor function. This has led to significant increase in the development of regenerative neural stem cell therapies that would be able to differentiate and form new networks leading to improved recovery. Neural injury often leads to a toxic environment not conducive to tissue regeneration including the expression of reactive oxygen species (ROS) and inflammatory cytokines. Advances in regenerative medicine focusing on the development of multifunctional nanoparticles (NPs) for delivery of synergistic antioxidants and anti-inflammatory agents to the mitochondria of cells followed by treatment with embryonic and induced pluripotent stem cells capable of differentiating into function neural progenitors can provide a platform technology to create a robust neural regenerative therapeutic system. In this presentation, we will demonstrate a novel combination treatment of mitochondrial targeted NP mediated delivery of synergistic antioxidant and anti-inflammatory agents and induced pluripotent stem cell derived neural stem cell therapy.

Trinucleotide Insertion and Deletion in TgTPC1 cDNA

Jay Dasigi
Dr. Silvia Moreno, Cellular Biology, Franklin College of Arts & Sciences

Toxoplasma gondii is an apicomplexan parasite, which can be grown in the laboratory in large quantities and is readily amenable to genetic manipulation. In an effort to better understand calcium homeostasis in this parasite, the two-pore channel TgTPC1 was studied. Two-pore channels are receptor complexes that have been recently discovered to release Ca2+ in response to NAADP. While trying to clone the gene coding for TgTPC1 in *T. gondii*, the results suggested that one TgTPC1 gene may be able to produce three different mRNAs (+3 nucleotides, wild type, and -3 nucleotides) by trinucleotide insertion and deletion. To further characterize this phenomenon, *in vitro* methods were used to exclude the possibility of an *in vitro* amplification artifact, and to confirm that there are 3 different populations of mRNAs. The different populations of the cDNAs were studied by direct cloning/sequencing, with a sequenced cDNA construct containing three extra nucleotides and the cloned genomic DNA used as controls. It is expected that there will be only one population of TOPO clones from the two controls, and that a different population of cDNA can be identified by direct sequencing the cloned RT-PCR products. This work suggests that *T. gondii* can produce 3 different proteins from one gene. There are more than a dozen neurological dysfunction diseases caused by trinucleotide expansion. Although DNA replication slippage has been widely accepted,

this is the first evidence that there is also transcription slippage. This work will shed new light on the molecular mechanisms of these neurological diseases.

Topology of the Ras Converting Enzyme
Dillon Davis
Dr. Walter Schmidt, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

The Ras converting enzyme (Rce1p) is a membrane-associated endoprotease of undefined mechanism that is involved in post-translational modification of the Ras GTPases and other isoprenylated proteins. Its role in Ras biosynthesis marks Rce1p as an anti-cancer target. By assessing the chemical accessibility of cysteine residues occurring naturally or substituted throughout the yeast Rce1p sequence, evidence is presented that Rce1p has eight inaccessible regions. Our evidence indicates that the natural cysteine residues of Rce1p lie within several of these inaccessible regions. Furthermore, we report that the natural cysteine residues are fully dispensable for enzyme activity, formally eliminating a previously proposed cysteine-based enzymatic mechanism for Rce1p. Our findings are most consistent with Rce1p having a single transmembrane domain near the NH2-terminus and seven additional segments that are either monotopic or tightly folded domains. At least one monotopic domain is expected based on the observation that Rce1p lacking the NH2-terminal transmembrane segment remains tightly membrane associated. The topological arrangement that we propose places the NH2-terminus within the endoplasmic reticulum (ER) lumen and all remaining segments on the cytosolic side of the ER, possibly within the cytosolic leaflet of the ER membrane itself. This arrangement allows for relative proximity of the three residues that are essential for yeast Rce1p function (E156, H194 and H248), consistent with their proposed role in forming an active site that lies at or within the cytosolic face of the ER membrane bilayer.

The Ordinance of 1669 in Application on the Grande Maîtrise de Toulouse as Documented by Louis de Froidour
Sara De La Torre Berón, Foundation Fellow
Dr. Ted Gragson, Anthropology, Franklin College of Arts & Sciences

Louis de Froidour was a forest surveyor appointed by Jean Baptiste Colbert during the reign of Louis XIV in 17th century France. Froidour was commissioned to document and represent the tracts of land owned by the inhabitants of the grande maîtrise de Toulouse, encompassing the southwest region of France. During his acclaimed tenure as surveyor, Froidour earned the title of France's "Grand Master of Waters and Forests." Using Froidour's personal records, archived in the Archives départementales de la Haute-Garonne and the Bibliothèque d'étude et du patrimoine de Périgord in Toulouse, as well as secondary literature, I evaluated the state of the land in the region Froidour surveyed before the implementation of the Ordinance of 1669. Using this information, I evaluated the lack of uniform land management policies across the grande maîtrise de Toulouse and particularly in the Pyrenees Mountains. The so-called "disrepair" in the land provided an impetus for comprehensive forest reform for the region Froidour surveyed, as well the entire kingdom. Finally, I also evaluated Froidour's methods of documentation and his personal impact on the surveying of land during his tenure, as well as his influence on later surveyors. This research contributes to the knowledge of land management practices in the area where Froidour conducted his surveys as well as the influence of economic governance on how local farmers determined the use of their lands.

The Relationship between Communication and Satisfaction with Change Management with Supervisor Trust as a Moderator

Shelby Devine, Kelsey Hardy, Katelyn Briggs
Dr. Karl Kuhnert, Psychology, Franklin College of Arts & Sciences

Every organization will experience change in one form or another, and it is how that change is managed that can facilitate successful employee attitudes regarding that change. Studies show communication and trust with one's superior are vital factors in employees' satisfaction towards change. We expect to find that supervisor communication strength will be positively related to employee satisfaction with organizational change. We also predict supervisor trust will moderate the relationship between supervisor communication strength and employee satisfaction with change management in that when trust is high the relationship will be stronger, but when trust is low, the relationship will be weaker. The data was gathered through self-reported surveys from a large Fortune 50 company. After analyzing the data using ordinary least squares regression techniques in SPSS, we found evidence that supervisor communication strength was positively related with employee satisfaction of change management. Additionally, we found support for supervisor trust moderating satisfaction with change management; however, the relationship was in the opposite direction from what we had predicted. Our results indicated that when supervisor trust was high, the relationship between supervisor communication strength and employee satisfaction with change was low. When trust is low, we found the relationship to be weaker. Our data shows that communication and supervisor trust impact how employees feel about change management. These findings can be utilized by organizations to facilitate change more effectively. This will contribute to the satisfaction of employees with organizational change and their company as a whole, ultimately resulting in greater organizational success.

Effects of Electrical Stimulation Intensity on the Non-invasive Evaluation of Mitochondrial Function Using Near-infrared Spectroscopy

Parveen Dhillon, Kanan Talati
Dr. Kevin McCully, Kinesiology, College of Education

Near infrared spectroscopy (NIRS) can be used to measure muscle oxygen consumption (mVO2). Repeated arterial occlusions after exercise provide an index of skeletal muscle mitochondrial function. The purpose of this study was to examine the effects of electrical stimulation (ES) intensity (i.e. current amplitude) on mVO2 and the recovery rate of mVO2 after exercise. Ten healthy subjects (age = 21.2 ± 1.4 years) were tested at three levels of ES current. Twitch ES (4 Hz) of the medial gastrocnemius/soleus muscles was used to increase mVO2. Repeated measures of mVO2 were fit to a monoexponential curve and rate constants were calculated. A force transducer was used to measure the time-tension integral (TTI) of ES exercises. Average currents used in this study were 45 ± 11, 61 ± 12, and 82 ± 14 mA for the low, medium, and high currents. Normalized TTI for low, medium, and high current trials were 54 ± 11, 82 ± 7, and 100 ± 0 % ($p < 0.001$). The initial (end-exercise) mVO2 were 2.56 ± 1.44, 3.64 ± 0.85, and 3.79 ± 0.60 %sec-1 for low, medium, and high current trials. NIRS rate constants were not different between trials (2.02 ± 0.54, 1.95 ± 0.44, 2.02 ± 0.46 min-1 for low, medium, and high current trials; $F(2,9) = 0.264$, $p = 0.771$, $\eta 2 = 0.028$). In summary, changes in ES intensity influence measurements of mVO2, but the recovery of mVO2 represents only the activated tissue and was independent of the ES intensity.

Abstracts

Analyzing Linkages between Economic Development Models and Food Security: Comparative Case Study of Thailand, Vietnam, and the Philippines

Colin Dungu
Dr. Jack Houston, Jr., Agriculture & Applied Economics, College of Agricultural & Environmental Sciences

This study seeks to answer the following question: What are the linkages between a country's development model and its food security? To answer that question, I compare the relationship between economic reforms and food security levels for Thailand, Vietnam, and the Philippines. This thesis emphasizes the economic rationale of liberalizing economic reforms and examines the reasons why those countries that adopt market reforms attract more foreign investment, which is the key to overall economic growth, and consequently food security. This study first investigates what is food security, and what are the causes of food insecurity. It then examines the economic models pursued by three Southeast Asian states that are relatively similar in population and size. Thailand and Vietnam have spearheaded forward in their goal towards attaining food security, whereas the Philippines remains a chronic importer of rice, which is their staple crop. The adoption of liberalization, trade, and market reforms in the former two has infused foreign direct investment (FDI) into the agricultural sector and enhanced efficiency in production methods, which has helped improve food security. However, by maintaining its reliance on the Import Substitution Industrialization (ISI) model for a significantly longer time period, the Philippines fell further behind in its economic development and failed to attract outside investment, which lowered agricultural production and increased food insecurity.

Text Messaging: A Tool to Increase Physical Activity Compliance?

Alexandra Ely
Dr. Michael Schmidt, Kinesiology, College of Education

Compliance of subjects is a key issue faced when implementing exercise programs. No universal recipe for success exists when it comes to increasing subjects' compliance to a physical activity intervention. Research has shown that increased levels of self-efficacy, social support, and knowledge about the benefits of exercise lead to greater compliance to an exercise program. The purpose of this study is to use accelerometry to analyze women's compliance to a walking program on weeks they receive motivational text messages as compared to compliance on weeks the texts are not sent. Participants, women ages 25-45, comprise three groups of six. During weeks three, five, and seven of the eight week intervention, each woman in a respective group receives a text on Tuesday, Thursday, and Saturday. These texts fall into one of three categories: self-efficacy, social support, or increasing knowledge. Every group is assigned a different category during each "text week," and during those weeks receives messages exclusive to that category. Post-intervention, total minutes walked during weeks when texts were received will be compared to those walked during weeks no texts were received. Differences between walking totals comparing texts from the three categories will also be examined. The impact of motivational text messages on program compliance will be analyzed to determine if text messaging is an effective tool to increase physical activity participation, as well as whether certain types of messages better increase participation. Results will have implications for the effectiveness of increasing physical activity compliance by use of motivational text messages.

Abstracts

Comparison of an Embedded Effort Measure on CNS Vital Signs between Older and Younger Adults

Sarah Evans
Dr. L. Stephen Miller, Psychology, Franklin College of Arts & Sciences

Adequate effort displayed by participants and patients is an essential foundation for experimental and clinical testing. Clinicians and researchers need to be aware of potentially invalid results that may not accurately reflect optimal levels of effort from subjects. The objective of this study was to compare effort between younger and older adults within the CNS Vital Signs test, a neurocognitive computerized test battery. An embedded effort measure for a variety of clinical domains was compared across old and young participants. This indicator was determined by comparing each participant's performance to cutoff scores on multiple tests. It was hypothesized that a higher percentage of older adults would demonstrate adequate effort compared to younger adults. Examining effort in both populations is much needed given the sparse literature examining effort performance on this test. Additionally, due to the widespread tendency of college students to be used in university studies, research highlighting their degree of effort will play a critical role in determining the credibility of their results and the impact of motivation on performance. The results will serve as an indicator of the differences in effort between age groups as a further step in achieving the goal that data being used to make conclusions or diagnoses is both appropriate and dependable.

Managers vs. Employees: The Differing Effects of Communication Strength and Supervisor Support on Work Engagement

Meghan Foley, Katryna McCann
Dr. Karl Kuhnert, Psychology, Franklin College of Arts & Sciences

Employee engagement can predict critical outcomes for the bottom line of business operations; organizations want employees to feel engaged and therefore be motivated to produce significant results. Research has focused on employee engagement, but significantly less research has examined managerial engagement. The purpose of the present study is to test whether or not managers and employees derive their sense of engagement in the same manner, which could ultimately lead to ways in which businesses can most effectively build an engaged workforce of both entities. We defined engagement as our dependent variable, and used leader-member exchange to predict the positive effects of communication strength. The nature of the social exchange relationship between supervisor and employee also led us to predict a mediating role of supervisor support on communication and engagement. Using data from a Fortune 50 company, we tested the effects of communication strength and the mediation of supervisor support on engagement for samples of lower level employees and managers. Results showed that for both employees and managers, communication strength had a significant impact on their feelings of engagement. However, when testing for mediation, supervisor support was not a mediator for employees but was a significant partial mediator for managers' engagement. These results imply that there may be differences in the way employees and managers become motivated and engaged in their work roles, and points to the need for more research on how to best engage managers.

Identification of GABA-responsive Neurons in the Zebrafish Brain

Hope Foskey, CURO Summer Fellow
Dr. James Lauderdale, Cellular Biology, Franklin College of Arts & Sciences

Over 2 million people in the United States have experienced unprovoked seizure activity or been diagnosed with epilepsy. While medication has been developed that can help some people control their seizures, the mechanism by which seizures occur is not well understood, and the neural circuits by which seizure activity is propagated are unknown. The purpose of my experiments was to identify the neurons likely to be involved in generating seizure activity by using zebrafish (*Danio rerio*), an emerging vertebrate model in the study of seizure disorders. To do this, an adult zebrafish brain was cryosectioned transversely, and GABA-responsive neurons were identified by immunolabeling for GAD65/67, GABA, and GABAAR. GAD is the enzyme that catalyzes the decarboxylation of glutamate to GABA, a major inhibitory neurotransmitter in the brain. These experiments identified for the first time the neural pathways in the zebrafish brain that are affected by seizure activity and provided insight into the pathways that normally are affected in human seizures.

A Testosterone Tale: Do Females Really Have Higher Levels Than Males?

Melanie Fratto, CURO Summer Fellow
Dr. Vanessa Ezenwa, Odum School of Ecology

Testosterone is the principal male sex hormone in mammals. Males typically have testosterone levels 2-7 times higher than females, and testosterone affects reproductive behavior and aggression. Recent studies in hyenas and hyrax suggest that in some mammals, females can show testosterone levels equivalent to males, with important consequences for female behavior. Data from a long-term study on Grant's gazelle (*Nanger granti*) in Kenya showed that testosterone levels of some females reached concentrations 10-fold greater than male concentrations. Variation in female testosterone was associated with reproductive status and aggression. Since this study quantified testosterone levels from fecal samples, and sex differences in fecal metabolite concentrations may not reflect actual differences in circulating testosterone, our objective was to investigate whether fecal testosterone differences reflect true differences in circulating testosterone between male and female gazelle. First, we tested whether serum concentrations showed the same differences between sexes as fecal concentrations. We found that the female fecal average was 2 times higher than the male average, but the male serum average was 3 times higher than the female average. Next, we collaborated with the UGA Complex Carbohydrate Research Center to isolate specific testosterone-like metabolites present in fecal samples that may explain the differences between the fecal and serum samples. We will test the metabolites for binding to the testosterone ELISA assay. This study will improve current understanding of biochemical controls on behavior.

Water Loss Rates of Two Terrestrial Salamanders, *Plethodon shermani* and *Plethodon teyahalee*, and Their Hybrids

Samantha Frigerio, Elijah White
Dr. Jeff Hepinstall-Cymerman, Warnell School of Forestry & Natural Resources

In the Southern Appalachian Mountains, two salamander species, *Plethodon teyahalee* and *Plethodon shermani*, hybridize across an elevational gradient. Studies show the upper bounds of this hybrid zone are expanding. We hypothesized that this upward movement is affected by differing water loss rates between species which, in turn, may affect their responses to climate change; specifically that *P. teyahalee*—located at lower elevations—has lower water loss rates than *P. shermani*—

located at higher elevations. We conducted a reciprocal transplant field experiment in which salamander water loss was measured in natural environmental conditions. Using linear mixed-effects models, we found that an interaction between body size and hybrid level most accurately predicted salamander water loss. A lab experiment was also conducted in which we measured water loss of individuals from the ends of the hybrid zone under controlled conditions. Using a repeated-measures ANOVA, we found a significant difference in water loss rates between the two species ($F_{30,930} = 2.325$, $P < 0.001$). Water loss is likely one factor contributing to the hybrid zone's upward movement. Future studies may determine how water loss affects behavior and project future zone dynamics in the context of climate change.

Landscapes of the Interior: Ethnobotany and Sense of Place among Karen Refugees
Terese Gagnon, CURO Summer Fellow
Dr. Virginia Nazarea, Anthropology, Franklin College of Arts & Sciences

Forced by ongoing government persecution to leave their homeland in Burma, Karen refugees residing in Georgia continue each day the process of remembering and reaffirming their cultural traditions while seeking meaning and belonging in their new environment. Through engaging in interviews and gardening practices with the Karen people this project examines the anthropological phenomenon of the 'landscape of the interior,' particularly as experienced from a transnational perspective. Recognizing the value of preserving genetic biodiversity alongside culturally situated knowledge, it aims to record—through the process of memory banking—ethnobotanical traditions of the Karen and their cultural relationship to the natural environment. One important product of this research is a compendium of plant species grown by Karen gardeners in Georgia. This compendium includes plant characteristics, methods of cultivation, uses, religious/cultural significance and photo documentation. Additionally, this project explores the role of 'interior landscapes' in shaping relationships with a new inhabited environment. This investigation seeks to benefit the Karen people and the community at large by encouraging the continuation of traditions — creating senses of 'rootedness' and preserving ethnobotanical knowledge and biodiversity. This research is approached with the belief that practices of remembrance and resilience are often the strongest means of combating forces of hegemony and oppression.

On Memory's Tidewater: Sapelo Island Documentary Project
Terese Gagnon, CURO Summer Fellow
Dr. Virginia Nazarea, Anthropology, Franklin College of Arts & Sciences

The Geechee Gullah people, descendents of enslaved individuals brought from the western coast of Africa, have inhabited Sapelo Island, Georgia for four centuries. Through closely knit community and a strong sense of place, their culture has maintained a distinct life way that includes knowledge and practices passed down from their African forbearers. Local traditions include unique forms of art, music, agricultural practice and the Gullah language. Though there were once many such communities, today the Hog Hammock community is the last intact Geechee Gullah community on Sapelo, and one of the last surviving in the world. The residents of Hog Hammock have clung to their deeply storied land for generations, despite numerous adversities. However, a drastic tax imposition now threatens to push them from their island home, potentially fracturing their community once and for all. Drawing on both anthropological and journalistic perspectives, this documentary aims to capture a glimpse of the history and feel of the Hog Hammock community, while exploring the ramifications of the recent tax legislation. It draws on interviews with Hog Hammock residents,

research on the history of the Island, discussions with prominent local figures, and footage of the Island community. Ultimately this cross-disciplinary project seeks to call us to our senses, appealing to our sense of beauty as well as our sense of injustice, hoping to stir within us the waters of place and memory.

Access Care

Smitha Ganeshan, Foundation Fellow
Dr. Monica Gaughan, Health Policy & Management, College of Public Health

In Athens-Clarke County (ACC), 20% of the population is uninsured and 38% of the population receives Medicaid assistance. This 58% of the population faces severe financial and structural barriers in accessing primary care services. Most of the uninsured and Medicaid patients are seen in Athens Regional Medical Center and Mercy Health Center's emergency departments, where the cost of care is mostly uncompensated and approximately three times higher than it would be in a primary care setting. Additionally, poor longitudinal care for chronic diseases results in repeated preventable hospitalizations. A thorough literature review was conducted to develop a policy proposal to make Athens-Clarke County more competitive for federal money and assistance through the Patient Protection and Affordable Care Act. After evaluating various policy alternatives based on a cost-benefit analysis, a proposal that calls for Athens to apply for a Health Professional Shortage Area (HPSA) designation was chosen. A comprehensive survey of all primary care providers in ACC was conducted, and the data shows that less than a handful of practitioners in ACC accept Medicaid insurance. This data supports the anecdotal evidence that describes the primary care provider shortage for low-income patients. This designation will ultimately enhance Athens-Clarke County's applications for having a Federally Qualified Health Center (FQHC) and improve low-income patients' access to primary care services in Athens. An integrated health system that provides adequate access to primary care services for low-income patients in Athens-Clarke County would improve community health, reduce health disparities, and reduce health costs.

"Pretty What?"— An Exploration of Society and Gender through Movement

Allison Gantz
Prof. Rebecca Enghauser, Dance, Franklin College of Arts & Sciences

"Pretty What?" is a choreographic work created to question societal norms. Specifically focusing on gender roles and beauty, this dance explores the heightened expectations present in our American culture. Representation is the central idea, and the tension between people's definitions of image and media-defined beauty are the resulting concepts. The intention was to begin the piece with the accepted, stereotypical images of men and women in society. Leaning towards nostalgia, I presented the highly stereotypical figures of glowing, elegant women and strong, domineering men. Then, a film of compiled images of women in magazine photographs and advertisements played to demonstrate the relevance of this work in the current society. After setting up a dichotomy of men and women, pretty and not so pretty, I blended the two definitions together through movement. The awkward deconstruction of gender and sexuality was the result. Research of advertisements and movement generated through conversation with the cast of my dance helped me create unexpected movement combinations and relationships. As a culmination of my research on image identity, I ended the dance in the middle, between hyper-sexualized gender extremes and irreverent gender role reversal. The idea of middle ground leaves someone being completely honest with who he or she is. How do people feel when they are alone with their thoughts? How do people

feel about their personal beauty and personal worth? I left the piece open ended in hopes that a viewer could consider these questions for him or herself, and question the magnitude of influence the media has on creating accepted roles in society.

The Death of the Death Penalty
Richard Gardiner
Dr. James Monogan III, Political Science, School of Public & International Affairs

The death penalty is a major topic in the realm of criminal justice policy. Past research has clearly shown that the death penalty is in decline across the nation. This paper researches why states differ in their capital punishment policies. I, however, propose that there are multiple factors all leading to the decline: the rise of the innocence frame, differing reactions due to error, economic feasibility, and changing public opinion. My research method is unique from other works in that I am studying public opinion at the state level combined with a coding system that assigns the level of restriction for each state's laws pertaining to the death penalty. I expect to find that public opinion is the single most important factor with economic factors being secondary. How death penalty policy is made in the U.S. depends on what the states are doing. Also, this study can be used in other areas of public policy to help examine future debates empirically. Because there is no actual contact with individuals and those defined as vulnerable, there are not any ethical implications hindering my study.

Compensatory Exercise and Thinness Expectancies
Ashton Garner
Dr. Sarah Fischer Nowaczyk, Psychology, Franklin College of Arts & Sciences

Women with eating pathology tend to report higher weight and shape concerns and more frequently list shape and weight as motivation for exercise than healthy women. Compensatory exercise (exercise performed in an effort to control weight/shape or in response to caloric intake) is considered a maintenance factor in eating disorders. Thinness expectancies (beliefs that thinness will improve the overall quality of life) are also strongly linked to eating disorder symptoms. There is little literature, however, examining the relationship between compensatory exercise and thinness expectancies. The present study was designed to examine the predictive relationship between thinness expectancies and endorsement of compensatory exercise using the TREI, EDE-Q, and exercise Timeline Followback calendars. Additionally, the study examined the specific types of exercise (e.g., walking, running, elliptical, etc.) that individuals who report compensatory exercise choose. Our data was obtained through self-report questionnaires completed by a sample of undergraduate women at a large southeastern university. Logistic regression will be used to identify participants as compensatory exercisers based on their endorsement of thinness expectancies. Additionally, in the sample of women who endorse compensatory exercise, we expect to find a significant positive correlation between the frequency of compensatory exercise and level of thinness expectancies. We further expect to find individuals who report higher thinness expectancies to engage in high-intensity cardiovascular exercises such as running. These findings will be a valuable addition to the current literature concerning factors of eating pathology and will have implications for both treatment and prevention programs.

Teacher Cheating Scandals in Georgia and Possible Policy Solutions
Eilidh Geddes, Foundation Fellow
Dr. Sylvia Hutchinson, Emeriti Scholar, College of Education

A major problem facing Georgia's education system is teacher manipulation of test score data, which was brought to the forefront of

public attention by the recent Atlanta Public Schools cheating scandal. Cheating scandals hurt the educational outcomes for children and erode the credibility of our schools. Current incentives align to push teachers towards cheating, and current testing practices make it possible for this cheating to occur. Possible policy solutions to address this issue include using an algorithm to better detect cheating, having outside monitors administer tests, changing legislation that creates bad incentives, and implementing a comprehensive testing policy. These four alternatives were evaluated based on their ability to reduce teacher cheating, improve educational outcomes, and be passed and implemented successfully. Of these four alternatives, a comprehensive testing policy would best meet these policy goals. This alternative would involve use of an algorithm to better detect teacher cheating, would provide guidelines for improved testing security, would mandate investigations by the state, and would increase legal education for teachers over the consequences of cheating.

Assessing the Role of Soluble TNF Receptors I and II in Placental Malaria

Mina Ghobrial
Dr. Julie Moore, Infectious Diseases, College of Veterinary Medicine

Malaria is an infectious disease from the parasite genus *Plasmodium,* which kills approximately 2.7 million people each year. *Plasmodium falciparum* causes a vast amount of malarial infections. Where *Plasmodium falciparum* is present, malarial infections in pregnant women is correlated with both maternal and neonatal morbidity, low birth weight, and a reduced chance that the offspring will survive their first year. In placental malaria, infected erythrocytes (IEs) gather in the intervillous space of the placenta. Sequestration of IEs in the intervillous space leads to changes in cytokine balance, namely an increase in TNF- α (Tumor Necrosis Factor). Low levels of TNF- α result in an enhancement of phagocytic activity, which works to control parasite densities; high levels can inhibit endocrine function and initiate extracellular matrix degradation, resulting in poor pregnancy outcomes. Activity of TNF- α can be modulated by its soluble receptors, soluble TNF receptors I and II. Understanding the role of soluble TNF receptors I and II can help to accurately diagnose placental malaria, be predictive of negative outcomes, and assess the role of oxidative stress in disease and role of Caspase 3 (CASP 3) for apoptosis. In these experiments, approximately three groups of mice are used: infected not pregrant (INP), infected pregnant (IP) and uninfected pregnant (UP). INP and UP mice are controls for parasitemia and weight, respectively. Furthermore, these mice are genetically modified to express 1) both TNF receptors I and II, 2) neither of the receptors, or 3) only one (soluble TNF receptor I or II). Approximately 15 mice are used per experiment. On gestation days 0 and 6-14, clinicals are performed on these mice. Clinicals include examining weight, hematocrit and parasitemia. Trends in these categories are then evaluated. On gestation day 14, mice are euthanized, and their placental tissue is further assessed. Placental tissues are analyzed using immunostaining for CASP 3, a protein associated with apoptotic cells. The expectation is that mice lacking soluble TNF receptors I or II will have less expression of CASP 3. Immunohistochemistry is used to further analyze mouse tissues. Additional examinations are considered to evaluate the role of oxidative stress in TNF knockout mice versus wild type. Understanding the role of soluble TNF receptors I and II has a plethora of benefits, ultimately leading to better understanding pathogenesis of placental malaria and being able to predict and control its associated outcomes.

Science Lecture Classrooms: Extending the Bounds of Creative Teaching and Learning

Olivia Gorbatkin
Prof. Tracie Costantino, Lamar Dodd School of Art, Franklin College of Arts & Sciences

How do we enhance the learning of science students in large lecture classrooms? Based on research of synergistic learning and creativity, students can benefit significantly in their ability to problem solve by increasing their creative thinking due to various pedagogical styles and curricular innovations. In this study science students at the University of Georgia will be surveyed about the most effective and ineffective teaching strategies in primarily lecture classes. I will also explore tactics in non-science classes that could be incorporated into large lecture classes, all for the purpose of enhancing the engagement of students with their professors and course material. I will additionally review existing research on synergistic learning, pedagogy, and attention span. Permission will be sought from the UGA Institutional Review Board before data collection will commence.

Cell Cycle Gating of the Mammalian Sonic Hedgehog Signaling Pathway

Philip Grayeski, Foundation Fellow
Dr. Jonathan Eggenschwiler, Genetics, Franklin College of Arts & Sciences

The Sonic Hedgehog (SHH) signaling pathway regulates cell fate specification, differentiation and growth within the tissues such as the central nervous system during metazoan development. While the regulation of cell cycle progression by SHH signaling has been extensively studied, it remains unclear whether the cell cycle controls response to SHH signals such that individual phases can be conducive or refractory for signaling. One reason to suspect this is the fact that primary cilia are required for SHH signaling in mammals, yet in cultured cells the primary cilium is present only in G1 (or G0) phases. A method in our lab was devised to assay the unspliced (intron-containing) mRNA signal of targets induced by a SHH pathway agonist to provide a real-time assay for pathway activity. Using this method, we analyzed the cell's response to the SHH agonist under different culture conditions and measured the half-life of the unspliced messages. The real-time responses will be determined with respect to each phase of the cell cycle, and data will be compared to the ciliogenesis profile in each cell cycle phase. These experiments will test the hypothesis that progression though the cell cycle gates Hedgehog pathway activity and that assembly and disassembly of the primary cilium may be responsible.

Examination of the Link between Glycosaminoglycans and Pectins

Elizabeth Guarisco
Dr. Carl Bergmann, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Glycosaminoglycans (GAGs) are polyanionic macromolecules localized in the extracellular matrix with roles in structures and cell function. Chondroitins, a class of GAGs, may also serve as biomarkers for disease diagnosis and progression (Rye et al., 2002). Furthermore, the application of chondroitins, and thus chondroitin degrading enzymes, extends to proliferation, cell communication, wound healing, tissue growth, and angiogenesis in abolishing tumors (Fikri et al., 2007). The corresponding plant matrix polysaccharides are the pectin polysaccharides, partially esterified macromolecular polygalacturonic acids (Gemeiner, 2012). Glycosaminoglycans and pectins provide, in separate species, similar functions. The similarity between the functions of pectins and GAGs suggests possible insights into the mechanism by which pectins impact human health. The three dimensional structures between bacterial enzymes which degrade chondroitins and fungal pectin degrading enzymes (PDEs)

show striking similarity. Pectin degrading enzymes could alter cell processes moderated by GAGs, opening up utilization of these molecules in treatment of conditions such as spinal cord injury, where improper deposition of chondroitins leads to inhibition of axon growth. Previous studies in our lab revealed that pectins are able to alter the glycosidic activity GAG degrading enzymes and conversely chondroitins are able to bind PDEs and alter their activity. The thermodynamics of binding of pectins to chondroitinases and chondroitins to PDEs is required to validate the appropriateness of these interactions *in vivo*. Such data is obtained using Surface Plasmon Resonance (SPR). We will present the results of our SPR studies of combinations of the pectins, chondroitins, PDEs, and chondroitinases.

Reliability and Validity Study of an Accelerometer-based Approach to Estimate Free-living Energy Expenditure

Ryan Guilbault
Dr. Michael Schmidt, Kinesiology, College of Education

Actigraph accelerometers track acceleration in three planes of movement, which provides an objective measure of exercise intensity during physical activity. Accelerometer data can be paired with an individual's oxygen consumption (VO_2) during exercise to generate a personalized prediction equation for energy expenditure (EE) at varying exercise intensities. The purpose of this research study is to evaluate the reliability and validity of free-living, EE estimates derived from individually calibrated accelerometers. Participants completed a walking bout of exercise at sub-maximal speeds, while wearing two accelerometers, on two different days. Participants also had their VO_2 recorded on both days using a COSMED $K4b^2$ (portable metabolic unit) to generate personalized EE prediction equations. Participants then completed bouts of brisk walking, outside the laboratory setting, with an accelerometer and a COSMED unit. Reliability of the accelerometer-based EE prediction equations was evaluated by comparing the prediction equations formulated on separate days. To test the validity of accelerometer estimates of EE, accelerometer predicted values of EE were compared to accepted COSMED measures of EE. If personalized EE prediction equations, formulated using accelerometers, prove to accurately reflect EE during free-living exercise, then accelerometers may be used to evaluate EE in a multitude of energy balance studies.

Anoxic Transition within the Smoky Hill Chalk Member of the Niobrara Formation and Its Effect on Organic and Inorganic C-N Assemblages

John Harper
Dr. Paul Schroeder, Geology, Franklin College of Arts & Sciences

World fossil fuel supplies continue to be constricted by the ever-increasing need for energy. Traditionally, this energy has been supplied by conventional oil deposits, but geoscientists are now searching for less conventional hydrocarbon deposits to satisfy global demand. Understanding the provenance and depositional history of the organic material in these deposits can greatly benefit exploration and recovery. Oceanic Anoxic Events (OAEs) may influence the quality and type of organic/inorganic sediments deposited. OAEs are interpreted as rapid, global depositions and concentrations of organic-rich marine facies. The Smoky Hill Chalk Member of the Niobrara Formation was deposited in the Western Interior Seaway during the Cretaceous (Coniacian–Santonian), which has been hypothesized as an OAE event. X-ray diffraction (XRD) and stable Carbon (C) and Nitrogen (N) isotopes were used to determine the concentrations of C and N in the inorganic/organic pools. Carbon pools identified include carbonates and organic matter (OM) with sub-pools of C-OM located as particulates and in interlayer sites of

the expandable part of mixed layered clay minerals (i.e., smectite). Nitrogen pools identified include N-OM particulate, N-fixed in clay minerals, and N-OM in interlayer sites of smectite. The mineralogical and isotopic data support oxic to anoxic conditions progressed upsection. An increase in the total percent carbon and nitrogen available within the organic assemblages was found, including an increase in lamination and inclusions of sulfide minerals. Understanding the accumulations of organic material and the progression of anoxia can assist scientists to pursue similar formations in the exploitation of unconventional hydrocarbon deposits.

Epigenetic Pathways and Glutamate Transporters in Neuropathic Pain

Hannah Harrison
Dr. Han-rong Weng, Pharmaceutical & Biomedical Sciences, College of Pharmacy

The mechanisms underlying neuropathic pain are not well understood. This presents difficulties for the development of an effective treatment. It is known that the major excitatory neurotransmitter glutamate holds a significant role in the development of neuropathic pain. There are many glutamate transporters that reuptake glutamate into the neuron and astrocytes from the synapse. One of such transporters that participate in neuropathic pain is the glutamate transporter amino acid transporter-1 (GLT-1). Additional molecular epigenetic pathways are known to be involved in neuropathy, particularly those of the pro-inflammatory cytokines interleukin-1β, TNfα, and interleukin 6. The purpose of this research is to investigate how epigenetic mechanisms are involved in the interaction of the cytokines and GLT-1. If neuropathic pain is created and sustained, then epigenetic mechanisms are involved in the maintenance of the neuropathy. In order to examine possible epigenetic mechanisms a partial sciatic nerve ligation (pSNL) neuropathic pain model was first developed using male Sprague-Dawley rats. Behavior tests were conducted to verify pain development in the model. The lumbar 4-5 spinal dorsal horn tissue from these animal models was then collected via laminectomy surgery for histone methylation analysis. Methylation modification mark at the histone H3-K27 is involved in cell proliferation and differentiation of glial cells. The results of this study demonstrated hypermethylation in the pSNL animal models. This evidence leads to the conclusion that epigenetic pathways are involved in the maintenance of neuropathic pain. The hypermethylation result suggests a possibility of more progenitor cell proliferation and less differentiated cells occurring at the molecular level of neuropathic pain.

Target Training: Is It an Effective Method for Enriching the Lives of Captive Capuchin Monkeys?

Amanda Heaton, Amy Cohen
Dr. Dorothy Fragaszy, Psychology, Franklin College of Arts & Sciences

We set out to evaluate "Target Training" for immediate food reinforcement as a form of enrichment to promote psychological wellbeing for five captive capuchin monkeys. The activity allows researchers to attract monkeys to a specific area, permitting, for example, modification of the cage or examination of the monkeys. Support for psychological wellbeing may result from positive interaction with humans and the learning challenge that the activity offers. Four of the five monkeys are housed in pairs; the fifth is housed individually. In each pair, one monkey is dominant, as evidenced by displacement of the other and unfettered access to offered resources. In training, the monkeys were reinforced for holding a plastic ball bolted to the end of a stick for an arbitrary length of time. Two to three days a week from November 14, 2012 to February 4, 2013, the subjects performed three trials of 5, 10, and 15 seconds each (9 trials total). All the monkeys mastered the task quickly, suggesting

that the task is not particularly demanding cognitively or motorically. Unexpectedly, subordinate monkeys had high rates of failure after mastery due to distraction and interference by the dominant monkey. We conclude that effective enrichment strategies cannot promote direct competition between pairmates in confined spaces. Target training fails on this measure, although it retains practical value for management. Offering challenging, attractive activities simultaneously to both monkeys may have better enrichment outcomes.

The Role of Lipid Fluidity in the Assembly of Trypanosome Lytic Factor

Matthew Hess
Dr. Stephen Hajduk, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Trypanosome Lytic Factor (TLF) is a minor subspecies (< 1 %) of high-density lipoproteins (HDL) that protects higher primates from the majority of African trypanosomes and contains haptoglobin-related protein (Hpr) and apolipoprotein L-1 (apoL-1). Although Hpr and apoL-1 assemble into the same HDL particle, no protein-protein interaction between the two has been reported. Here we have investigated a potential mechanism of HDL sub-speciation, and we propose that lipid fluidity plays a significant role in the assembly of TLF. It has been shown that the lipid component of HDL is sufficient for Hpr binding and that higher lipid fluidity confers faster association kinetics of Hpr. Utilizing a model liposome system and dye release assays, we show that apoL-1, like Hpr, interacts more rapidly with liposomes composed of phosphatidylcholines with short or unsaturated acyl chains. Additionally, we report that the incorporation of both cholesterol and ergosterol reduces the rate of apoL-1 interaction with lipid membranes. To study how apoL-1 affects the fluidity of the model liposomes, we utilized anisotropic dyes corresponding to different lipid bilayer regions. We show that apoL-1 decreases the rigidity of the interfacial region of the phospholipids and hypothesize that this prepares the HDL for interaction with Hpr. Our results suggest a potential mechanism of HDL assembly and sub-speciation that relies on sensitivity to lipid fluidity rather than protein-protein interactions. Understanding this mechanism not only impacts TLF-mediated killing of trypanosomes, but also cardiovascular disease and metabolic syndrome, in which the level and composition of HDLs is affected.

How the White Protestant Church Should Respond to Issues Affecting Lesbian, Gay, Bisexual, and Transgender People

Charles Hicks, CURO Graduation Distinction
Prof. Cynthia Tucker, College of Journalism & Mass Communication

The white Protestant church should expand upon Jim Wallis's notion that religion is "personal, but never private" to resolve its multiple positions on issues affecting lesbian, gay, bisexual, and transgender people. In my thesis, I discuss how the white Protestant church in the United States has shied away from public life since the Scopes Monkey Trial of 1925 and stopped offering institutional responses to public issues, as it did with the Prohibition movement and for women's liberation in the early 20th century. However, there has been a recent occurrence of a white Protestant-driven institutional response to the public issue of human trafficking via the End It Movement, which echoes Wallis's notion that a person's personal faith should affect his or her response to public life. The white Protestant church could use the End It Movement as a model for addressing the church's muddled stance on other social issues, including those affecting LGBT people, without compromising denominationally determined theology about LGBT issues. It is important for the church to address issues affecting LGBT people, because one-third of U.S.

Americans in 2010, according to the Public Religion Research Institute, said the messages from religious bodies are contributing "a lot" to higher suicide rates among lesbian and gay youth. Another third, according to the same study, said these messages contribute "a little."

Development of an Immunohistochemical Technique to Detect *Burkholderia mallei* in Horse Tissues

Yun Ho
Dr. Elizabeth Howerth, Pathology, College of Veterinary Medicine

Burkholderia mallei is a gram negative organism that is responsible for the disease glanders in horses. Infection can result in the formation of lesions in the lungs, ulcers in the mucosal membrane of the upper respiratory tract, skin lesions, and lymphangitis. *B. mallei* can also be transmitted to humans, resulting in pneumonia and skin lesions. This bacterium is difficult to visualize in tissue lesions even with the help of histochemical stains. Therefore, the goal of this research was to develop an immunohistochemical technique to facilitate identification of the organism in formalin fixed tissues from experimentally infected horses to study *B. mallei* pathogenesis. In developing this technique, we initially used tissue from mice infected with *B. mallei*, a variety of antigen retrieval methods, serum from both mouse and horse infected with *B. mallei* as the primary antibody at various dilutions, and a variety of detection systems. Once standardized for mouse tissues, we converted and optimized the technique for use in horse tissues. Our optimized protocol includes proteinase K as the antigen retrieval agent, mouse *B. mallei* antiserum at a 1:850 dilution, a commercial polymer detection system linked to horse radish peroxidase (Mach 3; Biocare), and DAB as the chromagen. This technique has allowed us to visualize bacteria in lesions within epithelium and extracellularly in exudate in tissues of experimentally infected horses. This technique will help us track the bacterium and better understand lesion development in glanders.

Top-down Control by Bonnethead Sharks in Oyster Reef Communities through Consumptive and Non-consumptive Effects

Zachary Holmes
Dr. James Byers, Odum School of Ecology

The eastern oysters (*Crassostrea virginica)* along the Atlantic coast are an important foundational species upon which many estuarine species are dependent for food and structure. Bonnethead sharks (*Sphyrna tiburo*) are the most abundant fish by biomass within some southeastern estuaries and likely play a vital role in maintaining healthy reef ecosystems. Our focus was to determine how bonnetheads exhibit top-down trophic control in oyster reefs through consumptive and non-consumptive effects. Bonnetheads are known to be voracious predators of blue crabs (*Callinectes spp.*) and therefore contribute greatly to estuarine trophic dynamics. In order to illuminate the methods by which bonnethead sharks control trophic dynamics, we conducted a replicated mesocosm experiment to examine how bonnethead sharks influence crab mortality and foraging behavior and how these effects on the crabs trickled down to affect species lower on the food chain, especially juvenile oysters. Our mesocosm study showed that sharks significantly impact juvenile oyster survival by reducing blue crab abundance and foraging. Bonnetheads, however, had little effect on mud crab (*Panopeus herbstii*) predation of oysters, with substantial quantities of oysters eaten even in the presence of sharks. We also quantified predation rates of crabs in field settings both on and away from oyster reefs. Our results indicate that crab loss is extremely high away from oyster reefs, often approaching 100% in a 12 hour period. These results indicate that bonnethead presence in oyster reef communities is a significant driver of blue crab behavior, but may have little

trickle-down effect on juvenile oyster mortality.

Converting Culture: Relating 19th Century Women's Dress to a 1960s Society

Emily Hoskins, Dakota Nesbitt
Dr. Fran Teague, Theatre & Film Studies, Franklin College of Arts & Sciences

Historical clothing designs change when translated to a stage or film environment to help the audience engage with the show and allow the actors more freedom with character and movement. Freddy Wittop's costumes for *Hello, Dolly* employed brighter colors, lighter fabrics, and embellishment to minimize weight and maximize movement. Using Wittop's designs and the costume itself in the Hargrett Library, we explored how that costume won the Tony Award.
The 1900s is one of the most fascinating eras of women's clothing. It is defined by its complexity, working its way from corsetry and crinolines to shirtwaists and bustles. Yards of fabric were tailor-draped onto corset-bound figures to create a pleasing silhouette. Innovations allowed for printed fabrics, but overall the colors remained drab and unexciting, at least to an audience living in the 1960s. The 1960s formed a sharp contrast with the 1900s as it pertains to women's clothing. Bright colors and prints, short skirts, and shift dresses that hid curves were very popular. The problem remains: how do you take such conservative dress necessary for *Hello, Dolly*, set at the turn of the century, and re-work it for a late twentieth-century audience? You hire Freddy Wittop. As a dancer for most of his life, Wittop knew how clothing moved. His costume choices for the musical *Hello, Dolly* were easy to wear and gorgeous to behold. He used every color of the rainbow and toyed with shapes and embellishments to create the illusion of a corseted silhouette without the restrictions.

Affordable Housing in a Poverty-Stricken Community

Kirstie Hostetter, Foundation Fellow
Dr. Meghan Skira, Economics, Terry College of Business

Students attending the University of Georgia inflate local rental property rates, reducing the amount of affordable housing available to the 34.6% of the population living below the Federal Poverty Line in Athens-Clarke County. A literature review was conducted to evaluate mandatory and incentivized affordable housing programs as well as the status quo based on three main criteria: increased efficiency of existing housing options, improved low-income household stability, and political feasibility. The analysis revealed that Athens-Clarke County should offer incentives to property owners equal to the market rates of participating units in exchange for designation as affordable housing. This policy would utilize the 23,277 rental rooms currently vacant, provide stable mixed-income living environments, and be implemented through the use of the $1,272,476 in federal funding received by the county for programs addressing issues of human development. An incentives program provides a realistic, timely solution to the pressing issue of affordable housing. Property owners are justly compensated for participation in the program, receiving money for units that would otherwise provide no source of revenue considering the 19% rental vacancy rate. Lower-income families experience the many benefits associated with mixed-income housing, including better school performance and a home environment conducive to a healthy family and financial life. Both participating and surrounding properties are not affected by the stigmas attached to traditional, concentrated affordable housing structures.

Abstracts

Relationship between Approximate Entropy and Dynamic Postural Stability in Ankle Instability

Katherine Hsieh
Dr. Cathleen Brown Crowell, Kinesiology, College of Education

Chronic ankle instability (CAI) is a condition of repeated episodes of the ankle "giving way" that develops after repeated ankle sprains. Approximate entropy (ApEn) measures the randomness of biological signals, while dynamic postural stability indices (DPSI) measure the ability to maintain balance transitioning from a dynamic to static position. Seventy-nine participants (21.04 ± 2.4; mass 70.31±13.70; height 169.70±9.85) completed three 10-second single leg balance tests and three vertical jump landings onto a force platform. Ground reaction forces were collected and exported. DPSI composite scores were calculated for the dynamic trials while ApEn was calculated in the anterior-posterior and medial-lateral directions during static balance trials. ApEn was correlated with DPSI to determine if a curvilinear relationship existed. Pearson bivariate correlations were performed, and no correlations were significantly significant ($r = -0.009$-0.077, $p>0.05$). Static and dynamic balance appears to measure different constructs, and ApEn and DPSI also seem to measure different components of those constructs. ApEn as a non-linear measure does not vary with the linear DPSI. Dynamic stability and variability may influence CAI, and ApEn and DPSI measures should be considered separately when trying to measure balance ability.

The Prevalence of *Salmonella* Infection in Various Southeastern Wild Aquatic Turtles and Captive Painted Turtles (*Chrysemys picta*)

Joyce Huang
Dr. Sonia Hernandez, Warnell School of Forestry & Natural Resources

There are very few studies of *Salmonella* infection in wild turtles. Although the prevalence of infection of aquatic turtles for the pet trade has been well established, the rate of *Salmonella* carriage by wild turtles is still largely unexplored. We had two objectives with this study: 1) to describe the prevalence of *Salmonella* infection of various species of Southeastern wild aquatic turtles; 2) to determine whether the infection status changes after placed in captivity and presumably stressful conditions. For the first objective, we sampled wild turtles. Using baited hoop traps, a total of 134 turtles were captured from seven sites in Athens-Clarke County, Georgia. Each turtle was kept in an individual, clean plastic container filled with roughly 1 cm water depth for approximately 12 hours until they defecated. Feces were collected with sterile disposable 1mL pipettes and immediately placed in 10 mL of dulcitol selenite broth media. The samples were submitted to Athens Diagnostic Laboratory within a 24-hour period from collection. Of the turtles previously captured, 21 were selected to investigate the second objective. They were housed individually in 10-gallon tanks at the Whitehall Herpetology Lab. Turtles were part of a concurrent study and underwent a minor surgical procedure during the first week, which is considered a stressful event. For a period of 45 days, weekly feces samples were collected from each captive turtle. In a second captive trial, 10 turtles were kept in the same conditions as the first captive trial. For this trial of 90 days, three feces samples were collected: one at the beginning, in the mid-period, and at the conclusion of the study. The feces were also submitted to

the Athens Diagnostic Laboratory for testing. The results of the studies are still pending.

In Vivo and _In Vitro_ Analyses of the Human Insulin-degrading Enzyme Reveal That the Yeast A-Factor Mating Pheromone Can Serve as a Universal Substrate for M16A Family Proteases

Kaitlin Hufstetler
Dr. Walter Schmidt, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Though the exact cause of Alzheimer's Disease (AD) is not fully understood, it is believed that its development is due to the accumulation of neurotoxic Aβ peptides. The M16A protease human insulin-degrading enzyme (hIDE) cleaves many small peptides, including Aβ. Thus, hIDE is of biomedical relevance because it is proposed to forestall the onset of AD by promoting clearance of these Aβ peptides. To better understand the function of hIDE, this study focuses on *in vivo* and *in vitro* analyses of hIDE. Using yeast as a genetically tractable model system, a yeast expression plasmid encoding hIDE was created and *in vivo* functional tests based on a-factor production were performed. Previously, it was determined that the roles of the yeast M16A proteases Axl1p and Ste23p in the production of the a-factor mating pheromone could be substituted by other non-yeast M16A proteases. It was expected and subsequently confirmed through a yeast mating test and an a-factor halo assay that hIDE can mediate a-factor production. Thus, it appears that a range of M16A proteases can be expressed and evaluated using the yeast system. This study was largely prompted by a recent *in vitro* study that demonstrated an inability of hIDE to recognize a synthetic substrate based on a-factor. The different outcomes of the *in vivo* and *in vitro* assays suggest that substrate differences underlie the differential outcomes. Nevertheless, our results demonstrate that hIDE can indeed recognize a-factor *in vivo* and supports that hIDE has enzymatic properties consistent with those of other M16A enzymes.

Resolving Species Relationships When Reproductive Barriers Are Incomplete: A Case Study in Drosophila

Devon Humphreys, CURO Summer Fellow, CURO Graduation Distinction
Dr. Kelly Dyer, Genetics, Franklin College of Arts & Sciences

Reproductive isolation is not an instantaneous process. Over time, geographic or ecological barriers can facilitate independent genetic changes such that populations may accumulate differences that prevent successful reproduction when they come back together. When populations have been separated for a long time, but are still reproductively compatible in the laboratory, we wonder whether they can be considered distinct species. Incomplete reproductive barriers correlate strongly with variable levels of genetic divergence, and understanding how many genetic differences are required for speciation is of key interest. Here, I use phylogenetic methods to reconstruct the evolutionary history of three closely related species with incomplete reproductive barriers: *Drosophila recens, Drosophila subquinaria,* and *Drosophila transversa*. I complement this with behavioral assays with classical genetic crosses to investigate how genetic divergence is associated with reproductive isolation. *Drosophila transversa* is found in Europe and Asia, whereas the other two species co-occur in North America. I find some genetic divergence between *D. subquinaria* and *D. transversa*, consistent with their strong geographical isolation, but I find no evidence of reproductive isolation between these species at either the premating or postmating levels. In contrast, I find that *D. recens* is strongly genetically distinguished from both *D. transversa* and *D. subquinaria*, and that unidirectional behavioral isolation as well as hybrid male sterility and cytoplasmic

incompatibility operate to keep these species separate.

Higher Education and Future Planning

Lindsay Ives
Dr. Leonard Martin, Psychology, Franklin College of Arts & Sciences

Higher education allows individuals to specialize their knowledge in a specific area of study. But what happens after they obtain degrees? Past studies have shown that changes in the labor market have affected the young adult's ability to achieve self-sufficiency. It has also been previously shown that the roles of social support and optimism in adaptability are important in making this transition. The current study focuses on how different guides regarding a person's future can affect psychological well-being. Participants completed surveys measuring different psychological traits while in the presence of a degree checklist (laptop condition), a career plan and notebook with questions about the relationship between college and career (notebook condition), or a blank desk (control condition). Data indicated that participants in the Laptop and Notebook conditions viewed the world as more hostile. Those in the Notebook condition also exhibited a higher search for meaning in their lives and lower life satisfaction. These findings suggest that current approaches to planning life after college may have negative effects on students. Checklists and plans regarding life after college may cause students to adopt a negative worldview and experience discontentment. Recommendations for approaching this school to work transition are included in this article.

Targeting the *Mycobacterium smegmatis cobU* Gene to Study Vitamin B12 Biosynthesis

Elena James, CURO Honors Scholar, CURO Summer Fellow
Dr. Russell Karls, Infectious Diseases, College of Veterinary Medicine

Mycobacterium tuberculosis (*Mtb*), the causative agent of tuberculosis, latently infects 1/3 of the human population and kills approximately 1.4 million people annually. The success of *Mtb* relies on its ability to obtain and utilize nutrients from the host. Vitamin B12 (B12) is a cofactor of various metabolic enzymes. *Mtb* appears to have a complete set of B12 biosynthetic genes. When assayed using a *Salmonella typhimurium* auxotroph, B12 is not made under standard culture conditions by *Mtb*, but is made by the nonpathogenic soil saprophyte *Mycobacterium smegmatis*. This might be due to tightly-regulated B12 biosynthesis in *Mtb* or perhaps *Mtb* produces a form of B12 that cannot be utilized by the salmonella auxotroph. My project investigates B12 synthesis in mycobacteria. Of the B12 biosynthesis genes, *cobU* encodes an enzyme that functions late in the assembly process and is less conserved between *Mtb* and *M. smegmatis* homologs than other genes in the pathway. The goal is to create a *cobU* knockout mutant in *M. smegmatis* and determine if B12 production can be restored by introducing the *cobU* gene from *Mtb*. Vitamin production will be examined using auxotrophic salmonella strains and by mass spectroscopy. A plasmid designed for use in knocking out *cobU* by homologous recombination will have the following features: ~1000-bp *cobU* flanking regions, an origin for replication in *E. coli*, a hygromycin resistance gene, and a sucrose counter-selection marker. Progress toward the completion of this plasmid and of the overall project will be presented.

Abstracts

Effect of Different Pheromones on the Transcriptional Activator LuxR in *Vibrio fischeri*

Dabin Ji
Dr. Eric Stabb, Microbiology, Franklin College of Arts & Sciences

In the marine bacterium *Vibrio fischeri*, bioluminescence is regulated in part by the pheromones *N*-3-oxo-hexanoyl-L-homoserine lactone (C6) and *N*-octanoyl-homoserine lactone (C8). These pheromones bind to and activate LuxR, resulting in induction of the *lux* genes responsible for luminescence. In this study we compared the response of four LuxR variants to different concentrations of C6 and C8. Bioreporter strains were constructed with luminescence controlled by one of four different LuxR's. We used two artificially evolved LuxR derivatives (LuxRA and LuxRB), and the wild-type LuxR's from *V. fischeri* strains ES114 and MJ11. ES114 and MJ11 have different luminescence and pheromone outputs in culture, and we hypothesized that they had evolved LuxR's with different responsiveness to C6 and C8. Using the Bioreporters, luminescence was compared with the addition of different concentrations of C6 and C8, alone and in mixes. With both LuxRES114 and LuxRMJ11, increased concentrations of C8 inhibited the stimulation by C6. In addition, lower concentrations of C6 elicited a luminescence response with LuxRES114 compared to LuxRMJ11. The differences in the two artificial LuxR derivatives were also compared. LuxRA responded similarly to C6 and C8. LuxRB responded to C8 but not to C6, and high concentrations of C6 could inhibit the stimulatory effect of C8. Our results raise exciting questions regarding the evolution of LuxR and its relationship with two distinct pheromones in *V. fischeri*.

Drug and Mental Health Courts in Georgia's Criminal Justice System

Melinda Johnson
Prof. Todd Krohn, Sociology, Franklin College of Arts & Sciences

Georgia's incarceration rates and annual budget have doubled over the past two decades. Without change, these trends are expected to continue in the years to come. One suggested solution is to increase the number of accountability courts, or courts that address a specific population while adhering to standard operating principles. These courts focus on the mentally ill and drug offenders that make up a significant portion of the prison and parole populations in the state. The purpose of this research was to compare the effectiveness of expanding the accountability court system with other alternatives that may address the same problem. Data included recidivism rates, cost estimates, current legislation, and past success rates of each alternative. An impact and goals analysis on feasibility, cost, and effectiveness was used to compare the options. The data supported the conclusion that accountability courts will be effective in lowering recidivism rates in addition to being cost effective and feasible to implement. This result has important implications for Georgia's criminal justice system, including increased promotion of humanitarian values and an estimated savings of $264 million over the next five years. Recommendations for implementing this policy and the challenges that it may bring are provided.

Autophagic Responses in the Murine Model of Placental Malaria

Mathew Joseph
Dr. Julie Moore, Infectious Diseases, College of Veterinary Medicine

Plasmodium falciparum is the deadliest malaria-causing parasite in humans. Malaria during pregnancy is associated with the accumulation of parasitized red blood cells and infiltration

of leukocytes in the placenta. This is known as placental malaria (PM). Autophagy is a vital catabolic process which involves cells degrading and recycling cytosolic contents because of nutritional deprivation and stress. We hypothesized that PM's symptoms will induce excessive autophagic activity in the placenta which contributes to poor birth outcomes. We have initiated studies on PM using *Plasmodium chabaudi* AS to infect C57BL/6J and A/J mice as models for understanding the immunopathogenesis of PM. On day zero of pregnancy, mice are infected with *P. Chabaudi* inoculum. Throughout gestation, secreted cytokines and chemokines are assayed by ELISA. At sacrifice, spleens and fetoplacental tissues are homogenized for proteins and RNA isolation. RNA is made into cDNA and real-time PCR is performed to assess levels of autophagy-related genes. Immunohistochemistry is performed to histologically view markers for autophagy-related proteins. Autophagy marker (LC3a, LC3b, BEC-1, and Atg5) levels are compared between infected pregnant A/J and B6 mice and their respective uninfected counterparts. Preliminary data indicate that *Plasmodium chabaudi* induces local and systemic profinflammatory responses, and autophagic response data will be analyzed to assess correlation with pregnancy outcome. In conclusion, our research analyzes the mechanistic basis for malaria-induced compromise of pregnancy, especially midgestation, when high parasitic density is coincidental with pregnancy loss in our model. Continued study promises to reveal common and critical mechanisms which contribute universally to malaria compromised pregnancies.

Academic Steroids: The Need to Control Adderall Abuse on University Campuses

Mugdha Joshi, Alex Edquist
Dr. Christopher Cornwell, Economics, Terry College of Business

Adderall is an amphetamine drug that is prescribed to treat symptoms in patients diagnosed with ADHD. While it treats excessive hyperactivity, impulsivity, and inattention, it can be highly addictive and has serious side effects including insomnia, anxiety, dizziness, and cardiovascular or psychiatric problems. Modern trends show that university students are abusing prescription Adderall when they do not have ADHD because it provides "laser-like" focus and enhances academic performance. Surveys show that 25 percent of college students admit to using Adderall to help prepare for and take exams. The increased abuse of Adderall has caused health problems in students; the number of 18-25 year-olds going to the ER because of ADHD stimulant medications has risen from 2,131 in 2005 to 8,148 in 2010, and half of those visits involved nonmedical uses of those medications. Though literature indicates that this is a growing problem in America, very little has been attempted from a policy standpoint to prevent it. Following an extensive literature review and after conducting interviews with administrators and health professionals at the University of Georgia, a policy has been developed in order to best address this growing concern for university students. The most feasible approach to solving this problem is to include Adderall awareness education in required student drug and alcohol education in order to combat students' lack of understanding of the dangers of Adderall abuse and its nature as a violation of student academic honesty code.

The Influence of Muscle Heme Concentration on Optical Measurements of Mitochondrial Capacity

Jane Jurma, Stephanie Tan, Graham Mercier
Dr. Kevin McCully, Kinesiology, College of Education

Near infrared spectroscopy (NIRS) has been used to measure muscle mitochondrial capacity in healthy and diseased humans. The NIRS technique uses changes in heme oxygen levels to measure mitochondrial capacity; however, patients with diseases could have reduced heme concentrations. The purpose of this study is to test whether changing muscle concentrations of blood alter the measured mitochondrial capacity. We first learned how to perform muscle mitochondrial capacity measurements using NIRS. Then measurements were made to select the muscle of interest (either vastus lateralis or medial gastrocnemius), and the type of exercise to perform (voluntary or electrical stimulation). Muscle heme oxygen levels were made with a commercial NIRS device (Portamon, Artinis LTD). After metabolic rate was increased with exercise, the rate of recovery of oxygen consumption was measured. A series of short duration ischemic periods produced by rapidly inflating a blood pressure cuff was used to measure oxygen consumption during recovery. The individual oxygen consumption measurements were fit to an exponential curve and a rate constant determined. The experiment will measure mitochondrial capacity in healthy college aged students before and after five minutes of venous occlusion (60 mmHg) to fill the muscle with blood. Voluntary exercise of the medial gastrocnemius will be used. Six subjects will be tested as prior studies suggest a medium effect size can be detected with this sample size. We predict that while venous occlusion will increase blood volume in the muscle, it will not change the rate constant related to mitochondrial capacity. NIRS studies of muscle are either ongoing or planned for people with SCI, ALS, COPD, PAD, and heart failure. This study will be very important in helping us interpret the results of the clinical testing.

Developing a Sustainability Policy for the University System of Georgia

Ian Karra
Dr. Laurie Fowler, Odum School of Ecology

With more built space than any Georgia state agency, the University System of Georgia has a significant impact on the energy budget of the state. But with student enrollment and square footage expanding every year, the system remains one of the largest university systems nationwide not to have a comprehensive sustainability policy to address associated growth, operations, and emissions. Additionally, this policy gap creates varying levels of funding and administrative commitment to sustainability and sustainability planning among the 35 individual institutions. Mechanisms in said sustainability policy should create new funding for sustainability initiatives, facilitate renewable energy purchasing and production, institutionalize sustainability planning, and involve students in the research/implementation process. The alternative that maximizes these qualities at lowest cost and ease of implementation is to standardize the green fee process, the self-imposed mandatory student fee. By reducing administrative barriers and promoting self-determination, the fee provides flexible funding for projects ranging from energy efficiency to green power purchasing. Clear allocation guidelines, such as those in policies from Tennessee and California, ensure that the funds are not used onerously on administrative costs and ensure student participation in administering the funds. As fuel costs and energy demand rise and state education funds take uncertain trends, controlling operations costs in a sustainable and inclusive manner is an essential part of the university system modeling responsible

investment, application of research, and student engagement.

Pervasiveness of Science News in First-world Countries vs. in Emerging Economic Powerhouses

Jeanette Kazmierczak
Dr. Leara Rhodes, Journalism, College of Journalism & Mass Communication

Many industrialized nations believe their leading national newspapers present accurate and adequate coverage of health and science news. However, financial hardships have caused many major print media to eliminate dedicated science sections. Therefore, the goal of this study is to assess science coverage in media within five countries – two industrialized countries, the US and the UK, and emerging economic powerhouses Brazil, South Africa, and India. I intend to gauge the pervasiveness and depth of science coverage in these countries using methodology similar to that employed by Veneu, Amorim & Massarani (2008) in a study on science coverage in Latin American countries. Using online versions of daily newspapers, I will choose two media sources from each country – one with a dedicated science section and one without – and will collect all science articles on the website for the same one-month period. Dailies without a dedicated science section will be searched for articles using key terms selected from science news aggregating websites like *Futurity* and from science articles in the selected papers with science sections. I expect most newspapers with a science desk will have fairly consistent coverage of science news, but daily papers without one will show stronger coverage in the U.K. and the U.S. than in Brazil, South Africa, and India.

Mitochondria Targeted Delivery of Cisplatin Prodrugs

Samuel Kennedy
Dr. Shanta Dhar, Chemistry, Franklin College of Arts & Sciences

Targeted delivery of therapeutics to tumor cell mitochondria could potentially be a powerful approach to selective cancer treatment. Cisplatin is one of the most widely used anticancer therapeutics, most notably for the treatment of ovarian and testicular cancer. Research focuses on minimizing cisplatin's toxicity and overcoming the resistance of the drug. Only 5-10% of the Pt(II) compound cisplatin that enters cells binds to its targeted nuclear DNA. We speculated that by re-routing the cisplatin in the form of a pro-drug and by using a mitochondria-targeted nanoparticle-based delivery vehicle to the mitochondria of cancer cells, thereby attacking the mitochondrial DNA, we would be able to provide a new therapeutic target for the age-old drug cisplatin. A promising strategy for achieving this goal will be discussed.

The Birth of Metrosexuality in South Korea

Gloria Kim
Dr. Katalin Medvedev, Textiles, Merchandising & Interior, College of Family & Consumer Sciences

In a rapidly modernizing world, clothing styles are expected to change according to the cultural standards of each generation. Despite this, the sudden eruption of the phenomenon of metrosexuality—characterized by individualistic and aesthetic male dress styles among young men (Yung, 2011)—in a conservative and collectivist society like South Korea is a paradox that symbolizes a lot more than just a change in fashion trends.
To explore the reasons for the cultural and social metamorphosis that underlies the emergence of South Korean metrosexuality, I have examined numerous academic sources

that discuss the country's shifting definition of masculinity and the transformation of its gender ideals. I found that in South Korea's patriarchal society masculinity is equated with mandatory military service, with men's financial ability to provide for their family, and with men's continuing rejection to participate in domestic labor activities. I realized that events such as the end of the Cold War, the 1997 IMF financial crisis, and the "Korean Wave" appear to be responsible for the birth of South Korean metrosexuality and the erosion of its traditional gender ideals. I argue that because of these occurrences South Korea's concept of masculinity has become flexible, malleable, and multi-dimensional. The new concept of masculinity is not confined to a simple distinction between "metro" or "masculine." Instead, it is a hybrid masculinity. Although the average young South Korean male dresses as a metrosexual, which would suggest a soft form of masculinity, the way he treats women and acts in his daily life continues to be driven by a traditional, male chauvinist attitude.

What Differentiates Certain Salmonella Serovars from Others in Their Ability to Cause Human Illnesses?

Lily Kim
Dr. John Maurer, Population Health, College of Veterinary Medicine

Salmonella enterica causes one million cases of gastroenteritis each year in the US. While certain Salmonella serovars cause thousands of illnesses annually, others are linked to only a handful of cases. *Salmonella Mikawasima*, a serovar from the coastal waters of Georgia, contributes to substantially fewer cases of salmonellosis than serovars such as *S. Typhimurium* and *S. Enteritidis*. In the Maurer lab, additional novel serovars have recently arrived, fully sequenced. I hypothesized that this disparity in virulence was due to differences in the distribution of pathogenicity islands (PAI) between *S. Mikawasima* and other more virulent Salmonella serovars. To test this hypothesis, we performed whole genome sequencing on a previously uncharacterized *S. Mikawasima* and compared its sequence to several published Salmonella genomes. We identified several PAIs and prophage genomes shared with a referenced Salmonella genome, LT2. We also determined *S. Mikawasima*'s evolutionary relatedness to other Salmonella serovars commonly associated with outbreak by focusing our phylogenetic analyses on a series of housekeeping genes common to several annotated Salmonella genomes. After analyzing our data, we found that *S. Mikawasima* was more closely related to a subdivision of environmental Salmonella than those serovars (*S. Enteritidis*, *S. Typhimurium*, etc.) commonly associated with human illnesses. *Salmonella Mikawasima* shares the same virulence composition as other Salmonella serovars commonly encountered in foodborne outbreaks. Rare occurrence of human illnesses associated with this serovar is more likely due to its distribution in nature. My thesis will detail my findings concerning these novel strains and the degree of relatedness between them and other highly pathogenic serovars.

Fanny Kemble: A Juliet of a Different Era

Hannah Klevesahl
Dr. Fran Teague, Theatre & Film Studies, Franklin College of Arts & Sciences

I will analyze Frances "Fanny" Kemble's interpretation of the role of Juliet in William Shakespeare's *Romeo and Juliet*. In analyzing her interpretation of the character, I will connect it to a historical point in time: the period of the American Civil War. Fanny Kemble, a British actress, married the plantation owner Pierce Butler and settled on his plantations on the Sea Islands in Georgia. Fanny was appalled by the treatment of the slaves and their working conditions, but was threatened with revocation of access to her daughters if she published anything about those experiences with slavery. Fanny Kemble

eventually separated from her husband and began touring in the United States as a notable Shakespeare reader. The Richard B. Russell Special Collections Library is fortunate enough to have Kemble's original copy of Shakespeare's "Works," in which she details many of her character analyses and her own rehearsal processes. With the help of Dr. Fran Teague, I will relate Fanny Kemble's interpretation of Juliet with her own disconnect from the slavery that she was faced with on Butler's Sea Island plantations. Juliet is forced to choose between two worlds, much like Kemble herself, who had to choose between access to her daughters or speaking out against what she thought was wrong. The actor's connection to the role of Juliet comes from a personal experience that encourages a different interpretation of the performance.

Trout Angler Awareness of the Hemlock Wooly Adelgid and Its Effect on Trout Habitat and the Available Treatment Methods

Matthew Knull
Dr. Neelam Poudyal, Warnell School of Forestry & Natural Resources

The Hemlock is a riparian tree that provides shade that keeps water temperature low in North Georgia streams and rivers. Hemlock Wooly-adelgid (HWA), an invasive insect accidentally brought from Asia, has recently become a factor in the death of Hemlock trees, resulting in high stream temperature and unsuitable habitat for trout. Brook trout, a trout native to the mountain streams of Georgia, cannot survive water temperatures above 77◦ F. This may lead to decline in the population of trout and other aquatic species. This could mean a lower catch rate and lower recreational satisfaction for Georgia trout anglers. While there are a number of treatment methods available to contain HWA, some are more harmful to the environment in general and aquatic species like trout. In addition, application of treatment methods in public lands could cost anglers in terms of increased access fee, license fee, etc., and expensive methods might not be a desirable option. The objective of this survey is to assess the trout angler's knowledge of and attitudes towards HWA and its potential impact on their fishing experience. This survey will also analyze and compare the acceptability of the different treatment methods among trout anglers. To meet these objectives, a convenient sample of trout anglers in Georgia is being sampled using a paper-based survey instrument. To increase the response rate, a variety of approaches have been taken to recruit participants in the survey. One approach is surveying trout anglers on-site at popular fishing areas. Another approach is surveying anglers at statewide trout fishing conventions and gatherings where a variety of trout fishermen will be in attendance. So far completed responses from 70 anglers have been obtained. Data is being analyzed using descriptive statistics and ANOVA tests. The majority of fishermen surveyed so far agree with the statements that Hemlocks are a valuable tree species and are being negatively affected by HWA. They also find the environmentally friendly treatment methods such as trunk injections and predator beetles to be more acceptable than soil treatments or foliar spray. The majorities are members of Trout Unlimited and, therefore, are assumed to be more specialized fishermen. This information will help researchers to understand what the majority of fishermen value, justify the protection of the hemlock trees along rivers and waterways and find treatment methods that are acceptable to fishermen who may have their values at stake in the deteriorating condition of trout habitat.

Abstracts

Key to Thrive as Larvae: Cross-fostering Analysis between Two Species of Burying Beetles, *Nicrophorus vespilloides* and *Nicrophorus orbicollis*

Kyungmin Ko
Dr. Allen Moore, Genetics, Franklin College of Arts & Sciences

Parental care is a specialized behavior found mainly in vertebrates. However, this evolutionary strategy exists in some insects, including burying beetle species such as *Nicrophorus vespilloides* and *Nicrophorus orbicollis*. Parental care in these two species is divided into two types of behaviors: indirect parenting, which is more commonly found in insects and direct parenting which is rarely found. Indirect parenting involves behaviors caring for the carcass, and direct parenting involves behaviors that directly interact with the larvae, including feeding the larvae mouth to mouth. Direct parental care given during the first 12 hours to *N. vespilloides* and *N. orbicollis* larvae is required for the survival of larvae. However, little is known about the amount of parental care provided by parents of each species and keys that trigger parenting for larvae of these species to thrive. Given that direct care rarely evolves, is it specialized in a species-specific manner or is the parenting of burying beetles generic? I tested this question using cross-fostering between species to measure the response of larvae to parental care given by an adult of the same or of a different species. The timing in which larvae appeared was controlled, because *N. orbicollis* required a longer time for their eggs to hatch due to their larger size. I found that parental care provided to larvae across the species is only subtly different, in that larvae survived as well if cared for by their own or a different species. Therefore, the larvae of these species need generic parenting to flourish.

A Comparison of the Effectiveness of Plant DNA Extraction Methods against Two Common Secondary Metabolites

Delaney Kolich
Dr. Marianne Shockley, Entomology, College of Agricultural & Environmental Sciences

Extraction of high quality DNA is usually required before performing downstream protocols such as PCR amplification or gene sequencing. However, extraction of DNA from plant tissue is often complicated by the presence of secondary metabolites, resulting in poor DNA quality or low yield. Success of the extraction is largely dependent upon the protocol used and the types and amounts of secondary metabolites produced by the study species. Alkaloids and terpenoids are frequently problematic secondary metabolites in DNA extractions. This study compared the quality and quantity of DNA extracted from *Asimina triloba* and *Vinca minor* (both produce high levels of alkaloids) and *Pinus strobus* and *Aloysia citriodora* (high terpenoid production) using a CTAB (cetyltrimethylammonium bromide) extraction, an SDS (sodium dodecyl sulfate) extraction, and a Qiagen DNeasy kit. Preliminary analysis of extracted DNA was performed using NanoDrop spectrophotometry and agarose gel electrophoresis. Preliminary quality and quantity measurements were then confirmed by analysis of representative samples from each species and extraction method using an Agilent Bioanalyzer. Observation of the differences, if any exist, in the effectiveness of these extraction methods against two common secondary metabolites could help guide researchers in selecting a DNA extraction method to begin work with new species of study.

Abstracts

Annotation of the *Sarcocystis Neurona* Genome - Challenges and Lessons Learned

Katharine Korunes
Dr. Jessica Kissinger, Genetics, Franklin College of Arts & Sciences

Sarcocystis neurona, a protist parasite of the phylum Apicomplexa, causes equine protozoan myeloencephalitis (EPM). We have undertaken the sequencing and annotation of the *S. neurona* genome. The completed sequence and annotation will hold significance for the equine industry and provide biological insights. We started with genome sequence data produced by 454 and Sanger, and transcriptome sequence data produced by 454 and Illumina. The RNA-Seq data was mapped to the genome using the reference-based TopHat/Cufflinks, and a *de novo* assembly was created with Trinity. RNA-Seq assembly data were used to generate gene predictions. However, predictors require training, and their outputs are often not consistent with each other. The process is further complicated by the fact that this is the largest genome found in the Apicomplexans, a phylum in which a large number of the genes, ~40%, are hypothetical. To approach the challenges presented by this genome, we decided to create a metric for evaluating the quality of our assemblies and improving gene-predictor training: the set of 1,000 orthologs found in the 15 other sequenced genomes in the phylum. We identified 782/1000 orthologs in *Sarcocystis*, and we annotated this set of conserved genes. Having manually analyzed the evidence and refined the annotations for this set of 782 genes, we now have a standard that is allowing us to evaluate the performance of several automated gene predictors and improve their performance in our automated annotation pipeline. This process is bringing us closer to a completed, high-quality genome annotation.

Influence of Weight Distribution on Biomechanics of Performance Horses

Simone Lalvani, Lauren Cobb
Dr. Kylee Duberstein, Animal & Dairy Science, College of Agricultural & Environmental Sciences

Injuries to a performance horse's lower leg are common and often result in lameness causing the horse to be retired. If a horse's gait is asymmetrical, then there is a possibility that the angles of joints directly related to weight bearing will affect the pressure placed on lower leg bones and tendons. One can assess the impact of this on the longevity of the horse's career by analyzing the relationship between asymmetrical rider weight distribution and its influence on the corresponding joint angles and other stride parameters. Using synchronized high-speed cameras, eight sound horses were recorded for multiple repetitions trotting through a 24.4×1.5 meter chute to evaluate stride length, velocity, swing time, stance time, and angles of front and hind leg using the program EquineTec. Each horse was subjected to three treatments in a random order: no added weight, equal distribution of 45 kg added weight, and unequal distribution (40:60) of 45 kg added weight. Observations indicate that horses bring their limbs farther underneath their center of gravity when carrying a load. Unequal distribution of weight does result in some gait adaptations, primarily in the proximal portion of the limb compared to the distal portion. Some natural gait asymmetry is present in horses, as observed by asymmetrical effects on fetlock dorsiflexion. Research of this topic is limited due to the difficulty of creating standard conditions measuring appropriate values to determine if there is an association between rider weight distribution and degree of lameness.

Abstracts

Grandparenting from the Dump

Madison Lamar
Dr. Denise Lewis, Child & Family Development, College of Family & Consumer Sciences

Data from 10 Cambodian grandparents raising grandchildren around the Phnom Penh Municipal Dump were collected through in-depth interviews and were analyzed using multi-stepped coding techniques. A multitude of factors that inhibit individuals' quality of life can arise in families in grandparent-headed households. It is typical that in such settings the middle generation is missing due to deaths or because of out-migration in search for better economic opportunities. An HIV/AIDS epidemic that has claimed large numbers of reproductive-aged members of society, few options for earning a living wage, and the resultant chronic poverty from these conditions have exacerbated the resources of many of Cambodia's families. Under the family stress theory, we propose that custodial grandparenting in skipped generation families triggers new challenges for older caregivers because this role is non-normative. This shift adds financial, emotional, physical, and psychological burdens to the grandparents, most of whom are in extreme economic crisis. Many must relearn childrearing under dire conditions. The themes from the interview narratives included the following: poverty and food insecurity, health concerns, and social disengagement. The grandparents alluded to the need for better respite care but also showed a great concern for the advancements of their grandchildren through educational achievements. These findings point to the need for better community empowerment and deliberate policy and welfare planning to cater to the needs of impoverished older grandparents heading grandfamilies.

Transforming Animal Shelters in to a Service-based Economy

Torre Lavelle, Foundation Fellow
Dr. Janet Martin, Small Animal Medicine & Surgery, College of Veterinary Medicine

Big Black Dog Syndrome, the extreme under-adoption of large black dogs in shelter settings, identifies certain characteristics adopters have historically discriminated against, which include specific breed types and traits (e.g. high energy, intense focus). Costing U.S. taxpayers a total of $2 billion to impound, shelter, euthanize, and dispose of homeless animals annually, these "problem dogs" account for a significant burden of that expenditure. The current model fails to realize key indicators of these dogs as potential candidates as service dogs. A thorough review of existing literature and economic modeling was conducted to develop a policy proposal to support a standardized screening process for these dogs and their selection to the type of service that suits each canine best, such as in handicap assistance, drug and bomb detection, therapy, and PTSD support. After evaluating various policy alternatives based on a cost-benefit analysis, the selected proposal focuses on cultivating working relationships between service dog training organizations with established internal breeding programs and shelters in order to encourage consideration of shelter dogs as a resource. Specifically, the policy would provide an educational mechanism to eliminate the stigma against using shelter dogs in service work, create a centralized network to identify service dog candidates within shelter environments, and establish pathways to facilitate transfer of these dogs to service dog providers. The innovative association will reduce the costs and public health concerns related to shelter overpopulation while increasing opportunities for the successful placement of some historically less adoptable dogs as service dog candidates.

Abstracts

Rekindling the Hermit Kingdom
Kangkyu Lee
Dr. David Williams, Religion, Franklin College of Arts & Sciences

North Korea continues to threaten international security and stability in East Asia. As global attention is diverted elsewhere, North Korea will continue its pursuit of nuclear weaponry. The Kim Jong-Un regime is altering its economic policies, going as far as allowing farmers to trade their crop, relaxing tourism, and reforming education standards. The United States' reluctance to participate in diplomacy is a fatal foreign policy that does not take advantage of the unique political climate. Economic engagement is the best way to jumpstart better relations with North Korea and pave the way for a well-coordinated and peaceful East Asia. Data demonstrates an increasing number of the North Korean population warming up to private economic practices. The purpose of the research is to explore possible alternatives to established American foreign policies and how it can impact prospective long-term interests in East Asia. The research accounts for empirical economic data used by Chinese companies and historical examples as a threshold for newer, better alternatives. In addition, statistics taken from research organizations will evaluate public and international perception of such alternatives. The alternatives discussed are the following: the status quo, a peace process, the establishment of a US-Sino trade partnership, and a comprehensive Six-Party aid package. These alternatives will be evaluated using criteria in the form of effectiveness, political feasibility, and cost. With Chinese investment in North Korea also steadily increasing and the interests of its allies in East Asia in mind, the United States should take initiative to normalize relations with North Korea and globalize its development. Satellite imagery demonstrates an expansion in rocket launch sites, and there is evidence that North Korea will be preparing numerous missile tests. Neglect of North Korea is an act of appeasement and North Korea is taking the opportunity to bulwark its belligerent rhetoric. With the Kim Jong-Un regime slowly sealing its power over the nation, the United States must take action. Economic engagement will result in long-term infrastructure development and better political decency.

Pharmacological Manipulation of the Neuromuscular Junction between Stem Cell Derived C2C12 Muscle Cells and Motor Neurons
Natalie Levey
Dr. Steven Stice, Animal & Dairy Science, College of Agricultural & Environmental Sciences

Nerve and muscle diseases are causes of conditions like amyotrophic lateral sclerosis and muscular dystrophy. Motor neurons (MN) synapse with muscles at neuromuscular junctions (NMJ). Excitation of MNs causes depolarization and releases acetylcholine (ACh), which diffuses across NMJ and stimulates muscle contraction. Replacing diseased tissues requires functional restoration of neuromuscular units. The purpose was to investigate the functional interaction between MNs and muscle cells, derived from stem cells. C2C12 myoblasts were differentiated into myotubes and cultured with differentiated MNs. Pharmacological manipulation was performed when cells began contracting five days after co-culture. Two experimental groups were used: 1) C2C12 + MN and 2) C2C12 only. Both were observed contracting before manipulation. Glutamate (10uM to 100uM) was used as an excitatory molecule that stimulates MNs. D-Tubocurarine (50uM and 100uM), ACh receptor antagonist, was used to block neuromuscular transmission. Unexpectedly, when C2C12 + MN plate was stimulated with glutamate (100uM), contractions stopped. In C2C12 only, glutamate (20uM) terminated contraction. Therefore, motor neurons affected contraction of muscles by dampening

inhibitory effects of glutamate in co-cultures. D-Tubocurarine (100uM) inhibited muscle contraction in both groups, while (50uM) had no effect, suggesting contractions were not initiated by MN. These preliminary results will be extended to investigate pharmacological effects on NMJ in co-cultures where muscles have not progressed to the contractile state to determine if functional neuromuscular units can be regenerated from stem cell-derived MNs and muscle cells. Once contractions can be manipulated, it will be possible to create more neuron-muscle systems that mimic the actual biological system.

Parental Meta-emotion Philosophy as It Relates to Child Emotional Functioning

Graham Levitas, Isabel Cohen, Brittany Saraga
Dr. Anne Shaffer, Psychology, Franklin College of Arts & Sciences

Parent meta-emotion philosophy (i.e., beliefs about emotion) is revealed through parental emotion coaching and communication regarding the identification, acceptance, and remediation of children's emotion experiences (Gottman, Katz & Hoovan, 1996). Emotion communication predicts child socioemotional adaptation (e.g., Gentzler, et al., 2005; Eisenberg et al., 1996), but further research is needed to examine a parent's meta-emotion beliefs as correlates of parent and child emotional functioning (Gottman, et al. 1996). We hypothesized that high parent awareness, acceptance and coaching would correlate with high child awareness and expressivity, and low child dysregulation, all of which were measured via parent and child Meta-Emotion Interviews (MEI; Gottman et al., 1996), and that parent/child MEI would correspond with measures of parent/child emotional functioning. Participants included 34 diverse mother-child (5-12 years) dyads who completed MEIs, parent self-report measures (Parental Stress Index- Short Form, Abidin, 1995; Difficulty in Emotion Regulation Scale, Gratz, 2004) and child self-report measures (Childhood Depression Inventory, Kovacs, 1992; Multidimensional Anxiety Scale for Children, March, 1997). Bivariate correlations revealed that child emotion expression was related to parent's emotional functioning: high parenting stress with less expression of sadness ($r = -.531$, $p = .013$) and anger ($r = -.485$, $p = .019$); parent emotion dysregulation with less expression of anger ($r = -.369$, $p = .064$). Children's greater comfort expressing anger was related to lower child depressive symptoms ($r = -.351$, $p = .092$). Coding of parent MEIs is underway to test other study hypotheses. Results suggest the importance of parent/child meta-emotion in child emotional functioning.

Mapping Narrative: The Structure and Composition of a Short Story Cycle

Daniel LoPilato, CURO Graduation Distinction
Prof. Reginald McKnight, English, Franklin College of Arts & Sciences

The first problem of studying the short story cycle—or the novel in stories, or the composite novel, or the novita—is one of terminology; what do we call it? This problem is resonant, however, of the broader problem of genre. When we speak of story cycles, we speak of an assemblage of stories which relate broadly in theme and characterization, even plot. Is the short story cycle, then, a novel told in stories, or is it a story collection that tells a novel? I will examine this question and another larger concern, in tandem with my ongoing composition of an original manuscript: the gesture toward myth. The story cycle, like the novel, tells a tale of breadth and scope; and, like the epics of Homer and Virgil, it tells a tale grounded in the episodic nature of the oral storytelling tradition. In light of literary theorists like Walter Benjamin, who examined the short story and its divergences from the novel, I will discuss three principle works—James Joyce's *Dubliners*, Sherwood Anderson's *Winesburg, Ohio*, and Ray Bradbury's *The Martian*

Chronicles—and their effects on the structuring and execution of my own creative thesis, the foundation of a story cycle investigating the notion of personal and cultural myth. My research will add a new voice to the narrow field of scholars studying the short story cycle and lend insight into the creative concerns of a writer at work.

Study on the Ste24p Zinc Binding Motif, Ste24p Substrate Loading Mechanism, and Archae Ste24p Homologs

Robert MacDonell, Dillon Davis, William Saunders III, Kaitlin Hufstetler, Colby Ruiz, CURO Honors Scholar
Dr. Walter Schmidt, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Ste24 is a protease that is involved in the processing of prelamin A in humans, the yeast a-factor mating pheromone, and unknown targets in other species. Mutations in human Ste24 may result in progeria, a disease characterized by accelerated aging. Ste24p is highly conserved among many species, so much so that yeast Ste24p can be functionally substituted by a eukaryotic ortholog, allowing for investigations relevant to disease in the case of human Ste24. Analyses of Ste24p have largely been limited to yeast and mammalian Ste24p. In this study we have cloned and expressed Ste24p from *Pyrococcus furiosus*, a species in the archae domain, in *Saccharomyces cerevisiae*. An *in vivo* assay based on a-factor production revealed a lack of enzymatic activity in this recombinant yeast strain, suggesting that functional similarity among Ste24p enzymes may be restricted to eukaryotic species. We are also investigating the importance of residues that are involved in coordinating a catalytic zinc cofactor associated with Ste24p. We have evidence that the mutation of a Glutamate residue at position 390 in yeast Ste24p abolishes activity as measured through an a-factor production based *in vivo* assay. The potential role of other residues in the substrate loading properties of Ste24p were investigated through analysis of recent structures defined for both *S. cerevisiae* and human Ste24p with a Difference Distance Matrix program. These studies are expected to provide more information on the enzymatic properties of Ste24p, leading to a better understanding of the role of this protease in disease.

Cope's Gray Treefrog's Preference to Occupy Different Colors of Artificial Refugia

Michelle MacKenzie
Dr. John Maerz, Warnell School of Forestry & Natural Resources

Treefrogs are beneficial to biologists as ecological indicators. Polyvinyl chloride (PVC) tubes are used to sample treefrogs in pine plantations. A technique that incorporates the biological capabilities or perceptual preferences of the animal is rare and makes this study unique. Use of artificial refugia is not an effective method in the Piedmont region. However, studies on amphibian color vision have demonstrated that the color white, the color of PVC pipes, is a wavelength that is avoided by treefrogs. These studies have also demonstrated that amphibians prefer to go to blue wavelengths. In this study, we conducted a controlled lab experiment to test Cope's Gray Treefrog's preference to occupy different colored artificial refugia. Treefrogs were individually placed in nylon mesh cages. Sixty-centimeter long PVC pipes with an inside diameter of 3.81 centimeters were spray-painted either blue, brown, or white. One of each color was placed in each cage. The tubes were terminally capped and filled with 15-centimeters of water. Each day, the color tube occupied was recorded. Refugia were rinsed to remove any trace pheromones and then replaced in random orientation. Frogs were removed from the study after 10 selections. We performed a one-way ANOVA test that indicated a color preference ($p < .001$) and a Tukey HSD post-hoc test showed that blue occupancy was more common than

brown and white PVC refugia, while there was no difference between brown and white. Thus, we recommend the use of blue refugia to be used in place of white refugia.

Development of a PCR-based Marker to Identify Overwintering Sites for *Exobasidium sp.* on Blueberries in Georgia

Ridwan Mahbub
Dr. Marin Brewer, Plant Pathology, College of Agricultural & Environmental Sciences

An emerging disease in Georgia and the southeastern United States, *Exobasidium sp.* is a fungus that causes fruit and leaf spots on blueberry that significantly decreases marketable yield of berries. We are interested in understanding the disease cycle, particularly where the fungus overwinters, so that improved management strategies can be developed. Our hypothesis is that *Exobasidium sp.* overwinters in buds of blueberry plants. *Exobasidium sp.* grows very slowly and is difficult to isolate from other fungi on growth medium, so in order to detect it we have developed an *Exobasidium*-specific PCR-based marker using primers for the internal transcribed spacer (ITS). Results demonstrate that successful amplification of ITS is possible even at low *Exobasidium* cell concentrations (≈4 CFU/μL) in the presence of blueberry plant DNA, indicating that our PCR-based marker is reliable for detection of potential overwintering sites. We used our marker to detect the fungus in blueberry buds, other plant tissue, soil, and plant debris collected from highly diseased South Georgia field plots prior to disease outbreak in the spring. We compared our results with low-disease plots at the same site and a control site in Watkinsville, GA where disease was not observed. Our expectation was that there would be frequent detection of *Exobasidium* sp. with the PCR-based marker in blueberry buds from highly diseased field plots, less frequent detection in buds from low-disease plots and no detection at the control site.

From Feudalism to Democracy: Using Political Philosophy to Reframe Traditional Distinctions between the Great Ages of Europe

Dalton Mark
Dr. R. O'Brian Carter, History, Franklin College of Arts & Sciences

This paper will examine the development of political philosophy in Western Europe during the fourteenth through eighteenth centuries. It is a refutation of the traditionally held perspective that the iconic periods of history were distinct ages, arguing instead that these periods were different stages in a larger global trend. The Middle Ages, the Renaissance, and the Enlightenment were together one extended reassessment of humanity and man's place in the world. This paper will examine the writings of such notable political philosophers as Dante, Brandolini, Machiavelli, More, Bodin, Montaigne, La Boetie, Hobbes, Locke, and Rousseau to demonstrate that political trends transcended political borders. I will focus first on Italy from the fourteenth century to the seventeenth century to explain the transition from a religion-infused feudalistic structure to an anti-monarchical despotism. Then I will focus on France and England from the seventeenth century to the eighteenth century to explain the transition to a democratic notion of the social contract. These political changes are demonstrative of the change in perspective of society from the importance of strong rule over an inferior public to the justice of a symbiotic relationship between rule and people. My research will demonstrate that this change in mindset did not begin and end in one year or another – it was instead a gradual transition that took place over several centuries. This reframing of the intellectual movements is important to properly understanding the progression of history and the foundations for various political structures in place today.

The First Rule of Camorra is You Do Not Talk about Camorra: An Investigation into the Rise of the Organized Crime Syndicate in Naples, Italy

Dalton Mark
Dr. Steven Soper, History, Franklin College of Arts & Sciences

In Naples, Italy, an underground society has a hand in every aspect of civilian life. The success of this crime syndicate, and others like it, is predicated on a principle of omertà – a strict silence that demands non-compliance with authority and non-interference in rival jobs. Presumably birthed out of the desperation of impoverished citizens, the Camorra has grown over the last three centuries to become the most powerful force in southern Italy. Nonetheless, in 1911, the Camorra was brought to a mass trial, resulting in the conviction of twenty-seven leaders. Unfortunately, the Camorra, indefatigable as always, has continued to run their illicit operations through recent decades, despite any arrests that may be made. It is important to understand the roots and methods of the Camorra because it is and will probably remain the uncontested strongest force in southern Italy. Research for this paper was based in secondary sources to synthesize the various theories and perspectives on this dangerous gang. Results showed that their resilience is based on their size, their depravity, their decentralization, and perhaps most importantly, the corruption of the government attempting to supplant them.

The Use of Scheduled Combination Treatments of Etoposide and Doxorubicin to Treat Feline Injection Site Sarcoma Cells

Steven Mathew
Dr. Robert Gogal, Jr., Anatomy & Radiology, College of Veterinary Medicine

Doxorubicin and etoposide, topoisomerase inhibitors, are known chemotherapy drugs utilized to treat select cancers in humans and veterinary species. A combination of chemotherapeutic drugs at doses lower than the IC50 could improve the therapeutic index of anticancer drugs, such as etoposide and doxorubicin, whose individual success rates are deterred by adverse side effects and drug resistance. The overall objective for this study was to determine the level of cell proliferation inhibition of feline injection site sarcoma (ISS) cells with doxorubicin and etoposide in scheduled combination treatments. ISS cells in monolayer cultures were plated in 96 well plates with treatments applied to quadruplicate wells followed by the timed addition of IC50, IC25, and IC12 concentrations of etoposide and doxorubicin. One treatment protocol consisted of adding different concentration combinations of both drugs within the same period of time. The second treatment protocol involved adding different concentration combinations of the two drugs with a time period ranging from 24 hours to 48 hours separating the addition of the first and second drug. At 72 hours, Alamarblue™ dye was added to each well, and plates were read 8 hours after dye was added. The data indicated that scheduled combined treatments of the two drugs did positively reduce viable cell proliferation compared to controls. Thus, these preliminary results suggest that combination of these drug cocktails at doses lower than the IC50 are efficacious for treating feline ISS with possibly lower adverse risks to the feline host.

Comparison of Crustal Chemical Composition of the Carolina Terrane and Inner Piedmont Using Vp/Vs Ratios Obtained from Broadband Seismic Data

Abigail Maxwell
Dr. Robert Hawman, Geology, Franklin College of Arts & Sciences

Seismic data from several seismic stations in Georgia and South Carolina are collected and analyzed. The chemical compositions of the Carolina Terrane and Inner Piedmont are compared using Vp/Vs ratios to determine if

there are any differences in the crust in these two locations. The structure and thickness of the crust are determined by processing the data collected from the seismic stations and the differences in crustal thickness can therefore be compared and possible reasons for such differences such as difference in topography or orogenic events are considered. The travel times for P waves and S waves produced by earthquakes vary with chemical composition of the crust and any structural features such as faults or areas of high topography that may be present in the particular area of study. The reflection, refraction and transmission of the P waves are also considered when determining the structure of the crust.

Performance on a Saccade Task under Varying Cognitive Load

Brett McCardel
Dr. Jennifer McDowell, Psychology, Franklin College of Arts & Sciences

Throughout the day we are bombarded with sensory input, and cognitive control processes help us determine what stimuli should be attended to or ignored. Eye movement tasks which require saccadic responses are excellent models for cognitive control processes in general because the stimuli can be tightly controlled and responses easily quantified. Thus, simple versus complex versions of the task can be compared. Prosaccades (rapid glances towards a visual stimulus) are more reflexive and easier to perform than antisaccades (rapid glances towards the mirror location of the stimulus). Antisaccades require the inhibition of a reflexive glance, are generally slower than prosaccades, and result in more errors. Previous research suggests that cognitive control may differ based on stimulus presentation. The current study will determine the response characteristics in a saccadic task involving manipulation of cognitive load, which will be done by varying the proportion of simple prosaccades to more difficult antisaccades on five separate runs. Participants will wear a headband with two small eyetracking cameras to record saccades. We will index the difficulty of each run based on reaction times and percent of correct trials to determine which proportion of simple and complex trials require the most cognitive control. It is hypothesized that a run with 50% prosaccades and 50% antisaccades will produce the greatest demand on cognitive control due to task switching. These results will add to our understanding of how cognitive control functions during eye movement tasks and possibly illuminate the limits of cognitive control processes within the saccadic system.

Development of Avian Infectious Bronchitis Virus-Like Particles

Julia McElreath
Dr. Mark Jackwood, Population Health, College of Veterinary Medicine

Infectious bronchitis virus (IBV) is the causative agent of infectious bronchitis, a highly infectious, globally distributed and economically significant upper respiratory tract disease in commercial chickens. IBV is an enveloped, single stranded RNA virus. The virion is composed of four structural proteins, Spike (S), Membrane (M), Envelope (E), and Nucleocapsid (N). M, E, and N compose the viral particle and package viral RNA during replication in infected cells, while S projects from the surface of the virus and is responsible for attachment and binding to host cells. We hypothesize that virus-like particles (VLPs), functional virions with no internal cargo, can be constructed using the four structural proteins individually cloned into expression vector systems. Reverse-transcriptase polymerase chain reaction (RT-PCR) will be used to amplify the four structural proteins individually, and they will then be cloned into a novel expression vector system. Plasmids containing the four structural genes will then be transfected into a mammalian cell line to produce VLPs. We expect that the expression system will

efficiently produce IBV structural proteins, and that the proteins will associate in transfected cells to produce VLPs. Currently, we have successfully cloned the four IBV structural proteins into the expression vector system and are culturing mammalian cells in preparation for transfection. Developing an efficient viral protein expression system and then producing functional IBV VLPs will be significant because they can be used as a delivery system to cells of the avian respiratory tract.

The Need for Universal Design: An Environmental Assessment of Residential Interior Spaces and the Built Environment

Brittany McGrue, CURO Honors Scholar, CURO Summer Fellow
Prof. Sarah Zenti, Textiles, Merchandising & Interiors, College of Family & Consumer Sciences

The Americans with Disabilities Act became law in 1992, mandating that all facilities integrate disability accommodations with those for the general public. Before 1992, individuals with disabilities were provided with separate facilities, if they were provided with any at all. The law stipulates that people with disabilities were a part of the general public and should be treated as such. While these regulations and standards made buildings and designed spaces more accessible to those with disabilities, they also discriminated against them, highlighting their differences. To combat this, some architects and interior designers began operating under the principles of Universal Design, which "implies that well-planned [spaces] will meet the needs of every user without drawing attention to persons with disabilities." To date, incorporating Universal Design into residential space plans and architecture is seen more as an option rather than a necessity. My research intends to demonstrate the importance of Universal Design in residential spaces. I used my first-hand experience of being temporarily handicapped to observe the difficulties disabled individuals face maneuvering in standard residential spaces beyond the typically included minimum Universal Design features. I made written observation and analysis about my day-to-day activities and challenges. I then detailed my findings in a weekly blog, highlighting the difficulties I experienced and how they could have been alleviated, to be used as a resource for other interior design students as they learn how and why it is important to incorporate Universal Design into their own work.

Policy Analysis: US-Afghanistan Reconstruction Efforts

Mackenzie McRae
Dr. Michael Beck, Center for International Trade & Security, School of Public & International Affairs

Operation Enduring Freedom [Afghanistan] includes a heavy reconstruction effort for Afghanistan's social, political, and economic infrastructure, notably the completion of the Afghani Ring Road highway system. The reconstruction efforts provide short-term solutions and fail to achieve long-term growth and stability. This analysis reviews the current US policy and proposes amendments to the US policy that will better incorporate current international infrastructure projects and Afghanistan's vast geopolitical trade potential. The current US policy addresses economic growth and road infrastructure as separate entities, but does not adequately incorporate Afghanistan's key geopolitical position. Neighboring states China and India, as well as the Asian Development Bank, have independently funded transport projects in Afghanistan, as the state is a regional bottleneck stifling transcontinental trade. This policy paper will analyze each US infrastructure project and propose a revised policy which better collaborates with non-US backed infrastructure projects in Afghanistan. The policy will use data on historical trade routes, incorporate the geographical distribution of Afghanistan's natural

resources, and the market demand to establish which infrastructure projects would best serve Afghanistan's economic growth. The U.S. has invested $100billion in to reconstruction efforts since 2002. Misappropriation of these funds will leave Afghanistan economically unstable, and its new democracy unsound. It is essential that the US policy promotes long-term socioeconomic growth in order to achieve democratic stability in the state.

Components of Economic Freedom and the Institutional Approach to Economic Growth

Peter Melampy
Dr. David Mustard, Economics, Terry College of Business

Recent economics research has investigated a new series of explanations for the wide disparities in long-term economic performance across countries. This relatively new approach, contrasted with the neoclassical and geographical approaches to economic growth, uses government and economic institutions to explain differences in growth. This approach primarily employs empirical studies rather than theory, as the neoclassical growth model cannot predict the effect of institutions on growth beyond their effect on the investment rate. Since this approach is less than 30 years old, discrepancies in many areas of the research persist, and the goal of this paper is to reconcile some of these disputes. This paper reviews the literature on various areas of this institutional approach to economic growth. In addition, I use data from the World Bank, the Economic Freedom of the World Index, and Transparency International's Corruption Perceptions Index to run preliminary OLS regressions on regulation and corruption to supplement the previous research. Reviewing the literature, I find that economic freedom indexes are correlated with growth and that, within these indexes, measures of rule of law and judicial system quality are most robustly correlated with growth. In my preliminary analysis of the data, I also find that economic regulation and corruption have no discernible effect on growth. Finally, I resolve disagreements in the current debate over whether political institutions cause growth or vice versa. I argue that terminology is the primary source of discrepancy and that while economic institutions and policies affect growth, democratic government structures do not cause growth.

"Why Is There an Alligator in My Pool?" Assessing Potential Range Shifts with Sea Level Rise

Lara Mengak
Dr. Nathan Nibbelink, Warnell School of Forestry & Natural Resources

Rising sea levels precipitated by climate change threaten southeastern coasts. Models indicate a substantial loss of salt marsh habitat and a transition from current freshwater marsh to saltwater and brackish marsh habitat, which could adversely affect marsh-dependent species. We will examine the potential responses of the American Alligator *(Alligator mississippiensis)* to sea level rise along the Georgia coast. Spotlight surveys will be used to determine alligator occupancy at randomly selected locations within potential alligator habitat (defined using existing landcover maps). We will then use alligator occupancy data and current habitat features to predict where alligators will be found in the future as a result of sea level changes. Preliminary modeling indicates a slight decline in total suitable habitat area, patch size, and habitat permanence. Habitat quality, however, shows a substantial increase. The model output maps show suitable habitat moving further inland due to sea level rise. These potential range shifts may put alligators into increasing contact with humans. Alligators displaced by sea level changes may be forced into new habitats, both natural and human occupied. Additional research may allow us to determine where alligators will move, changes in habitat size due to sea level changes, and the specific

responses of people to increased contact with these predators.

Early Developement of Benzimidazole Resistant *H. contortus* within Individual Sheep

Adam Michalak
Dr. Ray Kaplan, Infectious Diseases, College of Veterinary Medicine

Haemonchus contortus is a gastrointestinal haematophagic parasite which causes significant production loss and death of ruminants worldwide. Deworming drugs are administered to sequester *H. contortus*'s detrimental effects, but increasing resistance levels are rendering the drugs ineffective. However, little about the early-stage evolution of this developing resistance is understood. We hypothesize that the dynamics of the initial resistance development are significantly impacted by parasite load size and the number of anthelmintic treatments per sheep. A multiple-resistant population of *H. contortus* in the UGA sheep flock was replaced with a fully drug-susceptible population. The sheep herd was then moved to a new, parasite free, location. Sheep were treated with anthelmintics selectively based on parasite loads, and fecal samples were collected four times during the year to measure the worm-egg counts. Analysis of the fecal egg count data from 31 sheep demonstrated that the five with the highest totals contain 64.26% of the eggs, while the five with the fewest totals contain 0.52% of the eggs. The *H. contortus* eggs were then isolated from the feces for future DNA extraction and measurement of resistance-associated mutations in the beta-tubulin gene using real time PCR. Data will be analyzed to determine the impact parasite levels, treatment numbers, and sheep age have on resistance development. Results should provide a deeper understanding of factors contributing to the early-stage evolution of drug resistance in nematode parasites.

Trade-offs: The Effects of Contiguous Rivalries on International Decision-Making

Travis Miller
Dr. Andrew Owsiak, International Affairs, School of Public & International Affairs

When states face a trade-off between two salient conflicts, how do they choose to expend their scarce military resources? In this study, I argue that the existence of an interstate rivalry with one's neighbor compels a state to minimize the resources it commits to disputes outside the rivalry. A state will evaluate its distribution of capabilities and determine that the military threat and intense competition associated with contiguous rivalries requires the utmost attention for both offensive and defensive purposes. This is due to the opportunity for aggressive action that contiguity affords such adversaries and the willingness that rivalry pervades them with to fight over the issues inspiring the conflict. The leaders will then proceed to act more amicably in disputes of a non-contiguous, non-rivalrous distinction due to the relatively reduced saliency of such dyads. This allows the state to concentrate its resources on confronting the more primary, immediate threat – the rival state – thereby making its foreign policy more focused and efficient. I assess this argument by examining the behavior of major states over the period 1816-2001, both in conflict and negotiation. I also outline the implications of this study's conclusions in broad terms and in greater specifics as it relates to contemporary United States-China relations.

Civil Society Collaboration between the U.S., E.U., and Turkey

Kameel Mir, Foundation Fellow
Dr. Cas Mudde, International Affairs, School of Public & International Affairs

The U.S. faces a security concern regarding Turkey's accession to the E.U. Years of delay to Turkey's membership process are slowly beginning to evidence their effect on Turkish

politics. Turkish elites have stalled some of their progress towards meeting E.U. membership criteria, and in the realm of global politics, they have clashed with Israel and refuse to support further American sanctions on Iran. The Turkish populace has voiced a new aversion to joining the E.U., and Turkish public opinion of the U.S. ranks dismally low. In order to preserve the U.S.'s invaluable partnership with Turkey, the most powerful Middle Eastern democracy, the U.S. must strengthen Turkey's bond with the western sphere through substantially furthering its progress towards E.U. accession. Analyzing policy alternatives according to how they increased U.S. legitimacy through furthering Turkey's cause, political feasibility, and logistical success revealed a solution in the civil society arenas of Turkish, European, and American politics. Establishing and promoting collaboration between the leaders of the most influential CSO's in the three societies, specifically through a discussion on the place of religion in a democratic civil society, would target the crucial link between popular opinion and elite power. This alternative aims to address Islamophobia in the E.U. and U.S. and aversion to the West in Turkey, all the while assisting the progression of Turkey's democracy. As the Middle East writhes in chaos and as the U.S.'s ability to monitor the region dwindles, the timely implementation of this alternative becomes increasingly crucial.

Expression of Toll-Like Receptor-3 in Response to EHDV

Spencer Mitchell, CURO Graduation Distinction
Dr. Elizabeth Howerth, Pathology, College of Veterinary Medicine

Epizootic hemorrhagic disease (EHD) is a widespread disease affecting white-tailed deer and rarely cattle in North America. The disease is caused by epizootic hemorrhagic disease virus (EHDV), a double-stranded RNA virus in the orbivirus family that infects the endothelium lining the blood vascular system. Little is known about the innate response to infection with this virus. Toll-Like Receptors (TLRs) are proteins within a cell or on the cell surface that recognize and initiate a response to pathogen-associated molecular patterns (PAMPs). Toll-Like Receptor 3 (TLR3) is responsible for recognizing double stranded RNA (dsRNA) viruses. We hypothesize that TLR-3 plays a role in the susceptibility of deer to EHDV so the purpose of our project was to evaluate the response of TLR3 and the effect of such a response following inoculation of cow endothelial cells with EHDV. We performed a quantitative reverse-transcriptase polymerase chain reaction to evaluate changes in TLR-3 mRNA over time in cow pulmonary artery endothelial cells infected in vitro with various amounts of EHDV. We did not detect changes in the levels of TLR-3 mRNA in response to infection with EHDV. Next we will evaluate expression of NF-kB, a rapid response transcription factor that acts to produce an inflammation response in the body, which is up-regulated when ds-RNA binds to TLR-3 via immunohistochemistry. An increase in cellular NF-kB and a constituent level of TLR3 in the cell following infection might offer insight about the mechanism by which TLR3 is activated and potentially recycled following infection with EHDV.

Conformational Preferences of a Prototype Biomolecule in Liquid Helium Nanodroplets

Grant Moody, CURO Graduation Distinction
Dr. Gary Douberly, Chemistry, Franklin College of Arts & Sciences

We report the infrared action spectroscopy of a prototype dipeptide in low-temperature liquid helium nanodroplets. The molecule used for this experiment is Ac-Gly-NHMe (NAGMA). The NAGMA sample is vaporized, and the vapor is entrained in a beam of the helium nanodroplets. The

vibrational energy of the NAGMA molecules is quenched so rapidly (~1014 K/s) via energy transfer to the helium droplet that the conformational distribution in the vapor phase is frozen out upon helium solvation. Because the conformers of NAGMA cannot interconvert at the droplet temperature (0.4 K), the spectroscopy of the helium solvated NAGMA ensemble is representative of the conformational ensemble at the vapor temperature (~600 K) within the NAGMA pick-up cell. Possible conformations of this dipeptide were computed using *Gaussian03*, a quantum chemistry software package. Three local minima were identified using Density Functional Theory, and a molecular mechanics method was used to probe for additional minima on the potential energy surface. An infrared spectrum was obtained for helium solvated NAGMA in the range of 3200-3700 cm-1. Four distinct peaks were observed, signifying either bonded or free N-H stretches. These peaks are most likely due to two conformations of the NAGMA molecules, as the molecule has two separate secondary amines. Vibrational transition moment angles and permanent electric dipole moments were obtained experimentally for each of the peaks observed in the spectrum. The complete set of spectroscopic data is compared to the calculations of the various conformational minima in order to arrive at a definitive assignment of the conformations of NAGMA present in the vapor phase at ~600 K.

Occupational Complexity as a Predictor of Cognitive Reserve

Jake Moskowitz
Dr. L. Stephen Miller, Psychology, Franklin College of Arts & Sciences

The concept of cognitive reserve suggests that certain individuals possess built-up mechanisms that enable them to cope with the onset of degenerative neurological diseases better than others. This "reserve" of cognitive function is thought to be derived from a variety of demographic factors, including but not limited to occupational and educational attainment, race, gender, and age. The Wechsler Test of Adult Reading (WTAR) has proven to be a valid proxy for cognitive reserve in older adults, successfully predicting premorbid IQ in patients with minimal to mild Alzheimer's disease. WTAR scores have been shown to be heavily predicted by several demographic variables, including education, occupation, age, gender, race, and region of residence. The relative importance of occupational data to predicting WTAR scores, however, remains a point of some disagreement among researchers. This study seeks to determine the significance of occupational complexity toward predicting the WTAR values of a local older-adult population. Demographic data containing educational and occupational attainment, age, and gender were compared against participants' WTAR scores. When analyzed using a hierarchical regression model, occupational complexity was found to significantly predict WTAR scores, even when education, gender, and age were controlled for. This finding supports the notion that long-term occupational complexity contributes to cognitive reserve throughout one's life. While further research is needed, this link between occupation and cognitive reserve could contain valuable implications for the public health struggle against the rising global epidemic of neurological degenerative disorders such as Alzheimer's disease.

Stepping into Masculinity: The Dress and Body Modification of African American Fraternities

Amy Moulton
Dr. Katalin Medvedev, Textiles, Merchandising & Interiors, College of Family & Consumer Sciences

The cultural and sartorial practices of National Pan-Hellenic Council (NPHC) fraternity members play a key role in constructing the desired masculinity of the

fraternity men. The most obvious of these practices are the members' emphasis on particular sartorial styles during step performances and the body modifications—especially brandings—they routinely adorn their bodies with. Through my research and personal communication with NPHC members I have discovered that large-size brands are most coveted among Black Greek step performers because they require proportionally large arms that can be attained only through a grueling physical exercise regimen. Large brands that showcase strength and represent pain endurance are rights of passages for NPHC members to enter into manhood and gain acceptance into their close-knit subcultural group. Through the analysis of the dress, body modifications, and culture of the NPHC fraternities, one can discover how NPHC fraternities foster their members' perception of ideal masculinity. NPHC fraternities' step performances aid in mapping out and constructing the desired masculinity of African American men through the use of erotic costumes, suggestive chants, and sexualized dance moves that create an aura of heightened sexuality. The steppers' muscular and branded bodies suggest a relationship between physical strength, pain tolerance, machismo, and African American Greek life.

Story-gathering and Community Performance

William Murdock, Jr.
Dr. Fran Teague, Theatre & Film Studies, Franklin College of Arts & Sciences

As the 20th Anniversary playwright for *Swamp Gravy*, Georgia's official folk-life play, I collected stories from the community of Colquitt, GA, and used them to create a new community performance piece. Focusing specifically on one woman's story, I will detail the research process behind one scene, "Mail-Order Murderer." "Mail-Order Murderer" tells a story of intrigue, arranged marriage, false identity, premeditated murder, and criminal entrapment—all taking place within a few short days in 1961 on a sleepy, rural cattle farm in Southwest Georgia. Using findings from the Georgia Newspaper Project, I was able to reconcile the "officially reported" version of Levi L. Henter's arrest with the familial recollections of the victim's great-niece. This story offers historical significance as the rediscovery of an almost forgotten story in Georgia's history. Forensic pathologist John Coe, who worked on inquests into the assassinations of John F. Kennedy and Martin Luther King, Jr., called the Levi Henter case one of the most fascinating of his career. This information, coupled with research into Depression-era Circuses was used to create a scene for Georgia's official folk-life play.

Investigating the Indirect Effects of Guppy Introduction on Populations of a Shredding Caddisfly in Trinidadian Streams

Kelly Murray
Dr. Catherine Pringle, Odum School of Ecology

In Trinidadian streams, guppies (*Poecilia reticulata*) have naturally colonized or were introduced to regions where previously only one other fish species, the killifish *Anablepsoides hartii*, existed. A survey of macroinvertebrates in eight streams, each with paired reaches with and without guppies shows that guppy presence is associated with higher abundances of the leaf-shredding caddisfly *Phylloicus hansoni*, an important decomposer in these stream ecosystems. Reaches with long-term guppy presence exhibit the greatest differences when compared to their killifish-only reaches. Our aim is to tease apart mechanisms for these observed differences. Benthic macroinvertebrates are important resources for both fish species. We hypothesize that interference competition between introduced and native fishes will result in niche partitioning within the community. To

determine this, we are analyzing gut contents of killifish from killifish-only reaches as well as guppy+killifish reaches, which are at different time points of guppy introduction: 2-3 years, 35 years, and 100+ years. This experimental design will allow us to assess any differences in how killifish forage in response to guppy presence through time. Relative amounts of defined food categories in gut contents will be quantified and compared between reaches, especially concerning amounts of terrestrial versus aquatic insects present. We predict that guppies' benthic foraging behavior causes killifish to feed preferentially on terrestrial insects fall-in compared to benthic invertebrates, including *Phylloicus*. Because *Phylloicus* is such a prominent decomposer of allochthonous material, differential predation by killifish on this aquatic insect would be an important factor affecting rates of leaf breakdown in these streams.

Three Dimensional Cell Based Assay Standard for Pharmaceutical Testing

Rebekah Myrick
Dr. William Kisaalita, College of Engineering

Present 3-D cell cultures for pre-clinical screening of pharmaceuticals lack a standard to validate their emulation of cells *in vivo*. Therefore, 3-D cultures reduce the use of humans and animals in the pharmaceutical industry, but the challenge to optimize the cultures make this innovation less cost efficient. This research investigates complex physiological relevance (CPR). CPR will confirm the formation of cell cultures that mimic corporeal arrangement and performance. In these experiments, the cell densities that yield optimal CPR in HEP-G2 hanging drop experiments were determined. Next, the materialization of cell cultivations resembling liver hepatocellular carcinoma cells (HEP-G2) will be validated by measuring albumin production (performance) and visualizing canaliculi formation (arrangement) with transmission electron microscopy and confocal microscopy. The resulting procedures will substantiate CPR of 3-D cell cultures and reduce costs in the pharmaceutical industry.

Characterizing a Novel Intragenic RpoN-dependent Promoter in Salmonella

Kiana Nezafat
Dr. Anna Karls, Microbiology, Franklin College of Arts & Sciences

Transcription initiation in bacteria is mediated by RNA polymerase in the presence of a sigma factor. There are two main families of sigma factors, sigma 54 (RpoN) and sigma 70 (RpoD). The mechanism by which RpoN directs the initiation of transcription by RNA polymerase is different from the RpoD-related sigma factors. *Salmonella enterica* subspecies *enterica serovar Typhimurium* (*S. Typhimurium*) has been a model organism for studies of bacterial gene regulation and is an excellent system in which to characterize the RpoN-dependent regulon. Our lab has identified several potential RpoN-dependent promoters in *S.* Typhimurium strains LT2 and 14028 in the presence of a universal activator of RpoN-dependent transcription, DctD AAA+, using microarrays and chromatin immunoprecipitation coupled to DNA microarray (ChIP-chip). A point mutation in the start codon of a secondary sigma factor in LT2 results in a less complex pool of sigma factors as compared to 14028s. One hypothetical RpoN-dependent promoter that was identified in LT2 is a potential intragenic promoter controlling the expression of a *cas1*-like gene in a CRISPR-CAS System. Although there are no differences in the hypothetical promoter sequences between the two *Salmonella* strains, we did not see strong activation from this promoter in the microarrays with 14028s, despite strong ChIP-chip evidence of RpoN binding in both strains. The work presented in this poster seeks to characterize this hypothetical RpoN-dependent promoter and its activation in 14028s using 5' RACE to map the

transcription start site for the RpoN-dependent *cas1* transcript and qRT-PCR to assess the transcription activity.

Vietnamese Language Attitudes, Use, and Identity: Determining a "Fobby" Vowel Quality

Minh Ngoc Nguyen
Dr. Chad Howe, Romance Languages, Franklin College of Arts & Sciences

In the United States, 2nd generation Vietnamese-Americans have varying levels of language proficiency and are often heritage speakers, usually never having learned Vietnamese formally. For this reason, we often see a varied array of how younger Vietnamese define their ethnic identity along the lines of language. This study will explore language attitudes, language use, and language and identity of 2nd generation Vietnamese-Americans in the Athens, GA area, particularly those attending the University of Georgia. The study will also analyze internalized racism among 2nd generation Vietnamese-Americans, examining the push towards a bi-cultural middle between "fobby" and "whitewashed" – "fresh off the boat" foreign and completely assimilated to American culture respectively. Participants will first be interviewed about their personal experiences, language fluency, and what it means to be Vietnamese. Then, participants will read sentences in English containing target vowels. After reading sentences in English, participants will engage in a picture identification activity, where they will be shown pictures of common concepts whose words contain Vietnamese target vowels. The two sets of target vowel frequencies, or formants, will be compared in order to determine if participants demonstrate any cross-linguistic influence from one language to the other. Participants will finally answer questions about what it means to be or sound foreign, or "fobby." The results of the study will provide insight on societal pressures Vietnamese-Americans may feel concerning their language proficiency and their ethnic identity while determining if there is a quantifiable foreign, or "fobby," vowel quality in certain speech patterns.

Structural Evolution of the Ca_2^+/Calmodulin Dependent Protein Kinase

Tuan Nguyen, CURO Honors Scholar, Ramsey Scholar, CURO Summer Fellow
Dr. Natarajan Kannan, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

The Ca_2^+/Calmodulin Dependent Protein Kinase (CAMK) of the eukaryotic protein kinase (EPK) superfamily forms a large group of homologous protein kinase implicated in diverse cellular functions. Although past studies have provided extensive insights on the CAMKs' diverse modes of regulations, substrates, and functions, the evolutionary basis of the CAMKs' structural divergence has not been well understood. Here, we identify selective sequence constraints unique to the CAMKs and its family members via a Bayesian approach. Our analysis of CAMK specific constraints reveal a contiguous network of co-conserved residues that physically link the EPK specific hydrophobic network to distal sites along G-H-I domain (CAMK Network) and a distinctive H-helix N-terminal capping motif. We found a conserved insert segment unique to many of the CAMKs that are structurally coupled to the EPK core via layers of co-conserved residues. Many family-specific constraints and variations reveal features building upon the CAMK Network. Further analysis points to convergent mode of CAMK-like structural motif across sparse families across the kinome. We thus propose that the CAMK core form an allosteric module that can mold the dynamics of the C-lobe to exert control of catalytic activity. Our analysis provides avenues to elucidate allosteric regulatory mechanism unique to the CAMKs, aiding the drug discovery efforts and building a

framework to study other cell signaling systems.

Dormant: A Photographic Series

Michelle Norris
Prof. Marni Shindelman, Lamar Dodd School of Art, Franklin College of Arts& Sciences

Dormant is a series of images that investigate the action of watching the television. Each image portrays a human that is vacant, in addition to the pixelated image of that which they are watching. This concept grew out of my interest in television culture, the uncommonly seen state of its viewing, and the film *Evidence* by Godfrey Reggio, in which children are filmed while viewing TV. My subjects would watch their favorite television show or movie as they were photographed. The photos were produced with a digital camera combining the glowing light from laptops, televisions, and colored light bulbs. The series reveals an alien and submissive human state that is evoked when these subjects mentally check out and live vicariously through programming. This work is important for continuing the research of other artists who are interested in investigating the physiological aspects of this common activity, as well as the consequences to follow.

Removing Barriers to Vision Services for School Children

John-Jordan Nunnery
Dr. Neale Chumbler, Health Policy & Management, College of Public Health

Barriers between students and vision services have a negative impact on student performance both inside and outside of the classroom. An estimated one in every five US school children has an undiagnosed vision problem, a burden that disproportionately affects low-income and minority students. Elementary school students with uncorrected hyperopia earned perceptibly lower achievement scores in one British study, while another study conducted in New York found correlation between students' performance on vision tests and percentile of grades earned. While these findings do not imply direct causation, the role that poor vision plays in a student's sub-par performance cannot be denied. The social impact of poor vision has also been documented. One Baltimore study found that a vast majority of juvenile delinquents screened failed vision tests. School implemented vision screenings are not improving eyesight in the classroom. In one study, roughly only a quarter of at-risk students received follow-up care after failing school vision exams. Barriers to follow-up care are logistical (difficulty scheduling appointments), financial (no insurance), and social (parents with disabilities) in nature. A thorough literature review was conducted to develop three policy alternatives. The policy proposals were evaluated by a cost-benefit analysis, the degree to which the policy would increase access to vision services, and feasibility. From this analysis, the policy alternative that calls for state funding for a mobile vision clinic program was chosen. This program would be managed by a non-profit organization, similar to the mobile vision clinics found in Florida and California.

Classification of Protein-ligand Interactions of P-glycoprotein

Phillip Ogea, CURO Summer Fellow
Dr. Arthur Roberts, Pharmaceutical & Biomedical Science, College of Pharmacy

P-glycoprotein (P-gp) is a transport protein found in the membrane of mammalian cells that plays an active role in the efflux of drugs and toxins. While P-gp protects cells from natural toxins, it also hinders metabolism of modern pharmaceuticals by preventing them from entering target cells. P-glycoprotein is well documented for its wide substrate promiscuity; it transports a wide variety of drugs with varying structure and function, contributing to what is known as multiple-drug resistance. P-glycoprotein was

discovered in 1976, yet scientists still do not fully understand the nature of its protein-ligand interactions. A clear knowledge of these interactions is vital to classifying the activity of P-glycoprotein. This project has used various methods, mainly nuclear magnetic resonance (NMR) spectroscopy, to collect data on P-gp's interactions with several ligands. This data can be matched with computer-simulated models of binding to create testable hypotheses on the location of binding sites. Additionally, activity assays can be paired with spectroscopic data to examine the rates and kinetics of drug transport. A collection of data on protein-ligand interactions, based on a variety of substrates, should establish trends that can better define the activity of P-glycoprotein. If the binding interactions of P-glycoprotein were elucidated, its contribution to multiple-drug resistance could potentially be circumvented. With this knowledge, drug developers will be able to produce more effective medicine for patients.

An Assessment of Neutrophil Enrichment by Single Step Differential Density Separation

Batare Okivie
Dr. David Hurley, Large Animal Medicine, College of Veterinary Medicine

Neutrophils are used as an indicator of innate immune function. A simple method is used to enrich the neutrophil population from blood. The purpose of a study in our lab is to assess the function of an oral immunestimulant, using neutrophil function as a monitor of innate immunity. During these studies, the purity of the enriched neutrophil population was questioned. My study assesses the enriched neutrophil population using microscopic differential leukocyte counting and compares these finding with the differential leukocyte distribution of these cells by flow cytometry. Our hypothesis was that the enrichment of leukocytes collected from blood using a single step density gradient of 1.077 gm/ml would yield at least 70% of neutrophils. The neutrophil fraction was collected, and slides were prepared using a cytocentrifuge. The slides were stained with a commercial Wright's stain kit. A classical differential count (neutrophils monocytes, and lymphocytes) was done using a compound microscope by counting at least 200 cells per slide. These results were compared to the "leukogram" generated from a forward angle and side scatter assessment of the cells using a cytometer and analysis software. A comparison of the correlation between the microscopic distribution of leukocytes and that from flow cytometry will be assessed. To date, it appears that samples taken 30 and 60 days pre-delivery and those taken 30 days after delivery were consistently enriched in neutrophils. Samples collected 1, 7 and 14 days after delivery contained a smaller fraction of neutrophils.

Transmission Strategies of *Trypanosoma cruzi* in Wild Reservoir Hosts

Ronke Olowojesiku, CURO Summer Fellow
Dr. Nicole Gottdenker, Pathology, College of Veterinary Medicine

Trypanosoma cruzi is the cause of Chagas disease, a zoonotic vector-borne protozoan parasite affecting approximately 10 million people worldwide. Better understanding the means through which *T. cruzi* is transmitted to animal hosts will contribute to strategies aimed at reducing the number of *T.cruzi* infections in humans. The objective of this study is to describe factors influencing T. cruzi infection in the common opossum (*Didelphis marsupialis*), a key reservoir for Chagas disease in Panama. Based on previous studies, it was expected that *T. cruzi* would be detected at higher levels in the scent glands than in the blood of the opossum. Samples were collected from the blood and scent glands of opossums trapped around the Panama Canal. PCR tests showed a higher detection of *T. cruzi* in the scent glands (6 positive/15 tested) as compared to the blood (1 positive/15 tested). Additionally, ecological

factors affecting transmission were evaluated. Because the palm *Attalea butyracea* is a known habitat for the Chagas disease vector, we hypothesized that there would be more *T. cruzi* infection in the opossums from a densely populated *A. butyracea* region. The study results supported the hypothesis, but more data is needed. I discuss findings from this preliminary study in relation to their significance for *T. cruzi* infection dynamics.

Analysis of P1 Function in *Mycoplasma pneumoniae* Adherence and Gliding

Babajide Oluwadare, CURO Honors Scholar, CURO Summer Fellow
Dr. Duncan Krause, Microbiology, Franklin College of Arts & Sciences

Mycoplasmas are small bacteria having a minimal genome and no cell wall. This study focuses on *Mycoplasma pneumoniae*, a human pathogen causing bronchitis and primary atypical "walking" pneumonia. Despite its small genome *M. pneumoniae* has a complex, differentiated polar structure called the terminal organelle. The terminal organelle initiates mycoplasma binding to receptors on respiratory epithelium and is the motor for gliding motility. Located on the terminal organelle surface is the P1 protein, which functions directly in both cell adherence and motility. There is evidence from recent studies to indicate that P1 repeatedly catches and releases sialic acids, present on animal cell surfaces, to thrust the mycoplasma cell forward. Furthermore, P1 is believed to exist in conformationally distinct subpopulations that shift when mycoplasma cells glide. Little is known about the specific mechanism by which the bacterium exhibits motility through the P1 protein. Learning about this unique form of movement can lead to new strategies for treatment of infections and a greater understanding of bacterial motility. By means of immunofluorescence microscopy with monoclonal antibodies specific for P1, mAB1 and mAB2, we sought to define quantitatively the location and relative amounts of P1 subpopulations. The antibodies mAB1 and mAB2 consistently yielded distinct labeling patterns which were not the result of background or "noise." Furthermore, mAB1 appeared to bind only to a subset of P1 proteins and only at specific times, as opposed to mAB2, which appeared to bind to all P1 at all times.

Finite-difference Time-domain Investigations of Metamaterials

Elliot Outland, CURO Honors Scholar, CURO Summer Fellow
Dr. William Dennis, Physics and Astronomy, Franklin College of Arts & Sciences

Metamaterials, artificially engineered materials possessing properties not normally found in nature, have a variety of applications in a number of fields. In order to put these materials to their best uses, it is necessary to understand how and why they work as they do. The finite-difference time-domain (FDTD) method is one way of achieving such understanding; by solving electromagnetic equations at different time-steps, one can gain information about the way that waves interact with the material in question at a future time-step. This new information can then be used to understand the interactions at a third time-step, and so on. Our research uses the MIT Electromagnetic Equation Program (MEEP) to perform FDTD analysis on the behavior of electromagnetic waves as they propagate through various materials in different configurations. After we specify the parameters of and run the simulation, MEEP produces an output file from which we can obtain numerical and quantitative data about the light-material interaction. Through this analysis, we can gain a better understanding of what properties produce what results; this will aid in the designing of metamaterials to better fulfill specific functions.

Abstracts

Characterization of the Light Signaling System in Fireflies

Jennifer Pallansch
Dr. David Hall, Genetics, Franklin College of Arts & Sciences

The universal nature of communication systems makes an understanding of their evolution a central question in biology. In the vast majority of species, the molecules underlying signal production and reception are usually unknown or complex, which makes an understanding of their evolution essentially intractable. In fireflies, however, light signal production is controlled by a single enzyme, luciferase, which acts by oxidizing its substrate, luciferin. My project fills in two gaps in our knowledge of firefly light production. First, the nature of the variation in luciferase genes between and among species was elucidated by recording emission spectra from fireflies in the *Photinus* genus using a portable spectrometer. These individuals were collected, and their identity was confirmed both molecularly and morphologically. This data was coupled with recorded activity times and background vegetation to compare two factors cited as possible influences on the evolution of light production, and this information will be supplemented by additional collections this summer. The second part of my project investigates the hypothesis that the luciferase enzyme is the sole determinant of light color variation. Luciferase genes will be sequenced across species to be cloned into a vector and expressed in *E. coli*. In this way, emission spectra that are the product of the luciferase gene alone can be measured with a portable spectrometer. By combining the *in vivo* and *in vitro* spectrum comparisons and field data, my work will contribute to a complete understanding of the evolution of a signal in a communication system.

Leading from Behind: A Progressive Outlook on U.S.-North Korean Relations

Jinny Park
Dr. Brock Tessman, International Affairs, School of Public & International Affairs

The Democratic People's Republic of Korea (DPRK) is notorious for its opaque foreign policy process and fickle approach to international diplomacy. For its part, the United States and its allies have focused on hard power tools such as economic sanctions and military posturing in their attempt to force the DPRK to abandon its nuclear weapons program. But there are important considerations that are being missed with the current foreign policy strategy employed by the United States. This paper addresses U.S. foreign policy towards the DPRK from a perspective other than that of scrutiny and disdain, and aims to outline what steps the United States should take to alleviate the current strained relationship. Numerous U.S. policy briefs, agency reports, and case studies of intervention from the late 1990s to the current era are used in support of my argument that using soft power and engagement policies will provide better policy results for the United States. In particular, I suggest that the United States has recently adopted a more supportive (rather than leadership) role with respect to international policy regarding Iran and Libya. Using a similar diplomatic approach, the United States can play a supporting role to China, which enjoys much greater leverage over the DPRK. Proposed alternatives are measured in the criteria of political feasibility, social equity, and effectiveness. Ultimately, the United States will have a better chance at building a working relationship not only with the DPRK but also with China, and spread its national interests of global peace, stability, and non-proliferation.

Abstracts

Understanding the "Gap" Effect in the Generation of Express Saccades

David Parker, CURO Summer Fellow
Dr. Jennifer McDowell, Psychology, Franklin College of Arts & Sciences

A saccade is a rapid re-fixation of gaze that can be elicited in experimental settings by having an individual fixate on a center point and then introducing a peripheral target. Previous studies have shown that when a brief "gap" period is introduced following the disappearance of a fixation point before the appearance of the peripheral target, it produces a significant portion of "express saccades" that are 40-50% faster than normal saccades. The highest proportion occur when the "gap" period is 200 ms. This experiment examines why a 200 ms "gap" period produces the highest proportion of express saccades, which will give key insights into how saccades are generated. In order to investigate this question, two groups of 15 subjects were formed; one consisted of a blocked interval group and one interleaved interval group. The blocked group performed 5 sets of 300 saccade trials, with each set having the same "gap" interval (0, 100, 200, 300, and 400 ms). The interleaved group performed 5 sets of 300 saccade trials with random "gap" intervals. Behavioral data indicated that only for the blocked group did a 200 ms "gap" period elicit the highest proportion of express saccades. This suggests that top-down cognitive processes involving expectation influence the production of express saccades. Future analysis of distribution statistics of the psychophysiological data will attempt to shed light on why the 200 ms "gap" period effect is only observed during the blocked condition. By investigating the mechanisms of saccade generation this experiment can give vital insights into the ocular motor system and top-down cognitive control processes.

Children's Emotional Awareness: Relations to Emotion Regulation and Coping in Middle Childhood

Heather Patterson
Dr. Anne Shaffer, Psychology, Franklin College of Arts & Sciences

Emotion regulation includes the processes involved in coordinating the intensity, frequency, and expression of emotions (Morris, Silk, Steinberg, Myers & Robinson, 2007). Children's ability to effectively regulate their emotions has important implications throughout their lifetime. In clinical populations, individuals with psychological disorders tend to modulate their emotions relatively poorly and children who do not develop early emotion regulation skills may have an increased risk for later psychopathology (Cole, Michel & Teti, 1994). The current study examines how children's awareness of their emotions relates to child emotion regulation. A racially diverse sample of 27 children (ages 6-12) was recruited as part of an intervention pilot study. Children completed the Meta-Emotion Interview (Katz & Gottman, 1986), a semi-structured interview including dimensions of the child's emotional awareness and dysregulation, as well as remediation strategies used to cope with emotions, specifically anger and sadness. It was hypothesized that children scoring higher on awareness would have lower dysregulation and higher remediation scores. Results supported hypotheses with moderate effects sizes, although the small sample size prevented correlations from reaching statistical significance. For sadness, awareness was associated with lower dysregulation (r = -.32) and higher remediation (r = .36). Similar relations were found for anger awareness with lower dysregulation (r = -.26) and higher remediation (r = .21). Interestingly, there was a significant positive correlation between dysregulation and remediation for anger (r = .39), but not sadness. Future analyses will incorporate other reports of children's

emotion dysregulation and behavior as they relate to children's own emotional awareness.

Lipid Association Improves Hemoglobin-binding Capacity by Haptoglobin Related Protein

Savannah Pena
Dr. Stephen Hajduk, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Haptoglobin related protein (Hpr) is a component of a minor subclass of human high density lipoproteins (HDLs) called trypanosome lytic factors that function in innate immunity against *Trypanosoma brucei brucei*. Hpr is >90% identical to the soluble serum protein haptoglobin (Hp); the major difference being the presence of a hydrophobic signal peptide in Hpr. This signal peptide mediates association of Hpr with HDL. Because purified Hpr does not bind Hb, it was hypothesized that the delipidated signal peptide interferes with Hb-binding. This hypothesis was tested using fluorescence spectroscopy. Hpr contains tryptophan residues that fluoresce, and as Hb binds to Hpr, the tryptophan residues are quenched and the relative fluorescence decreases. This change in the relative fluorescence was measured for Hb titrated into native Hpr alone, a recombinant form of Hpr which lacks the signal peptide, and native Hpr in a lipid environment. The lipid environments tested included high-density lipoproteins (HDLs) and 1-Palmitoyl-2-oleoylphosphatidylcholine (POPC) liposomes at two different concentrations. Recombinant Hpr and lipid-associated native Hpr showed Hb-binding capacity, and Hb-binding increases with higher concentration of lipids. This suggests that when the signal peptide on the native Hpr protein is delipidated, Hb-binding is inhibited and Hb-binding capacity is rescued in a lipid environment. These results have important implications for understanding the trypanosome lytic factors, which contain Hpr and require the binding of Hb for uptake into the trypanosome and killing of the parasite.

Increasing Access to Specialty Services in Community Health Centers: Policy Alternatives and Implications for Minority Communities

Emily Peng, Ramsey Scholar
Dr. Toni Miles, Gerontology, College of Public Health

Community health centers (CHCs) are federally-funded clinics that provide primary outpatient care to the country's most vulnerable communities. Because a significant portion of their patients are uninsured, insured by Medicaid, or from a racial or ethnic minority, CHCs play an important role in reducing health disparities. Despite their success in providing comprehensive preventive and primary services, CHCs are limited in their provision of specialty care. In a survey conducted by the Commonwealth Fund in 2008, 71% of 800 surveyed CHCs struggled to provide specialty services for patients insured by Medicaid, and 91% of the same centers reported difficulty in arranging specialty services for their uninsured patients. Barred access to necessary specialty services for a large segment of the population already suffering from health disparities holds drastic socioeconomic consequences. These include decreased workforce productivity and the overcrowding of emergency rooms. The current method of specialty care coordination where CHC providers use personal networks to solicit charity services is unsustainable. These informal referral networks require labor-intensive coordination and are extremely sensitive to economic recessions. Through extensive literature review and policy analysis, this paper proposes a two-pronged alternative to increasing access to specialty care in CHCs. CHCs located in remote areas without access to public hospitals should hire specialists on site, and those located in communities with public health infrastructure should engage in partnership contracts to

share resources. By increasing access to specialty care, CHCs can not only improve patient outcomes but also reduce the socioeconomic consequences of health disparities in the United States.

The Fever for Progress: Yellow Fever in 19th and 20th Century Havana and Savannah

Rachel Pérez, CURO Honors Scholar, CURO Graduation Distinction
Dr. Reinaldo Román, History, Franklin College of Arts & Sciences

Yellow fever outbreaks in late 19th century Havana, Cuba and Savannah, Georgia provide effective backdrops for examining the divergence of folk and professional healing. The epidemics both affected and reflected the demotion of certain religious and folk institutions to the status of outdated entities and concurrent elevation of biomedical science as a more modern and, therefore, superior mode of interpretation. These shifting attitudes are seen in the standardization of medicine, refinement of biomedical rhetoric, and labeling of religious folk healing practices as archaic superstitions. Besides yellow fever outbreaks, Havana and Savannah both experienced costly independence wars, reliance on the shipping industry, and considerable Catholic influence. The U.S. Federal Government did little to rectify the situation in post-epidemic Savannah, but seized on the Havana outbreaks as a means of demonstrating U.S. superiority and proving the necessity of intervention in order to bring modernity to the island. In both cases, civic institutions like the Catholic Church, the Savannah Benevolent Association, and *clínicas mutualistas* played significant roles in addressing the epidemics, particularly when governmental response was inadequate. These institutions faced the challenge of maintaining certain principles without appearing obsolete impediments to progress. This project deploys primary sources drawn from the archives of the Savannah Benevolent Association, the Catholic Church, 19th century medical literature, and military and government reports to offer a comparative account of the American "sanitation empire" from the 1870s to 1900s. The analysis reveals the role of religious and other non-state actors in modernization campaigns that are usually credited to the state.

Embodied Energy Requirements for Meat Calorie Versus Non-meat Calorie Production: A Comparative Study of Nine Countries

Miriam Perryman
Dr. John Schramski, College of Engineering

Energy return on energy investment (EROI) analyses have been performed on various societal and biological processes since the 1970s to evaluate energy efficiencies. If the system requires more energy to build or operate than it eventually returns, it is either inefficient or will soon cease to exist. This emerging method of analysis has been particularly useful in evaluating the efficiency of human food systems (e.g., energy invested versus dietary calories (Calories) produced). Given that upstream energy inputs (i.e., embodied energy) for meat and non-meat food products are very different (meat typically requires significantly more energy to produce), we propose a modified ratio of the embodied energies required to produce a society's meat versus non-meat food products. This would serve as a modern metric with expanded capabilities of quantifying a society's energetic efficiencies, its potential affluence, and overall nutritional quality of its diet. We either calculated the EROI of food systems or used existing EROI studies, along with additional data, to calculate meat to non-meat embodied energy investment ratios in nine countries. This value was plotted against each country's physiologic density (arable land per person), percent meat in diet, and annual Gross Domestic Product (GDP), thus providing quantified geographic,

social, and economic measures of that country's food supply system. We reveal that there is a notable correlation between this new metric and the other three measures studied. This may be significant as an additional application for EROI studies of food systems as a gauge of the overall status of a country.

Traditional and Environmental DNA Detection of a Rare Amphibian

Todd Pierson, Foundation Fellow
Dr. John Maerz, School of Forestry & Natural Resources

Much conservation attention has been directed towards the amphibian declines of the last several decades, but biologists wishing to study these amphibians are often faced with the difficulty of low detection rates. The Patch-nosed Salamander (*Urspelerpes brucei*) was discovered in Georgia in 2007 and is still found in just a dozen streams across a 7 km2 area. In order to develop a plan for the management of this species, we used leaf-litter traps to quantify the detect rate and understand fine-scale occupancy of *Urspelerpes* across its small range and additionally recorded data on all sympatric salamander species. *Urspelerpes* was found to have a stream-level detection rate of just .0476; when compared with the detection rates of sympatric salamanders (e.g. *Desmognathus quadramaculatus* at .9524), it is evident that *Urspelerpes* has a relatively low detection rate which is capable of hindering monitoring efforts. Motivated by these findings, we pursued an alternative means and developed an 'environmental DNA' assay—a relatively new method which allows for the detection of an animal indirectly through the detection of its DNA in the environment—to attempt to more effectively detect *Urspelerpes*. Here, we present the results of the leaf-litter trapping experiment and preliminary results of the environmental DNA sampling, and we compare and contrast the efficacy of these two methods. The results of this study have implications beyond the conservation of *Urspelerpes* and will be used for the further development of environmental DNA studies with other aquatic Appalachian salamanders.

Examining the Rates of Development of Manipulation and Nut Cracking Skills in Juvenile Bearded Capuchin Monkeys

Anakela Popp, CURO Summer Fellow
Dr. Dorothy Fragaszy, Psychology, Franklin College of Arts & Sciences

Bearded capuchins, *Sapajus libidinosus*, crack nuts using stone tools. Juveniles are not taught to crack. Instead, they observe adults cracking and practice manipulation and percussion of nuts and other objects for several years. We were interested in whether the rates at which young monkeys manipulated nuts changed as they got older. We collected data on a wild group of bearded capuchins (N = 20) in Piauí, Brazil. For 10 juveniles, we cataloged the behavior of each juvenile and its neighbors for multiple 20 minute observation periods during June – July in 2011 and 2012. In this report, we focused on three behaviors: manipulation of nuts and shells, all percussive activity, and striking a nut with a stone. We analyzed the difference in rates from 2011-2012 for these behaviors when one or more of the focal monkey's neighbors were cracking nuts, and when no neighbor was cracking. We found no consistent directional change for these variables, but large changes across years for the four older monkeys (from 3.5 to 4.5 years or older) for all manipulation, and large increases in percussion for the 3 youngest monkeys (from .5 to 1.5 years), especially when no others were active. Overall, these results show no significant change in rates of percussive and striking behavior from 2011 to 2012 except for the youngest monkeys, and group activity did not alter the pattern. It appears that social context does not consistently affect the magnitude of the change in the component behaviors.

Abstracts

The Few. The Proud. The Marines.

Alexandra Prather
Dr. Katalin Medvedev, Textiles, Merchandising & Interiors, College of Family & Consumer Sciences

This paper explores the history, meaning, cultural significance, and material properties of the Marine Corps dress uniform. My research was conducted through academic books and journals, miscellaneous references, and an interview with a Marine Corps officer. My research demonstrates the importance of understanding each part of the Marine Corps uniform as well as explaining the culture and historically rich meanings that each detail represents. My study also shows what type of person is qualified to wear the Marine Corps uniform. I discuss the rigor of the process and competition required to become part of the highly selective Marine Corps. From my research I have concluded the true meaning and significance of being a Marine soldier and how wearing the uniform influences their personal and professional lives. Each detail of the uniform represents a part of the Corps' 237-year-old history. The United States Marines not only proudly fight and work for worldwide freedom, but also make a strong effort to honor all fallen Marines that came before them. An example of this is the 'blood stripe' down the pant leg of officers' uniforms, which represents the Marines before them. A better understanding of the Marine Corps culture as well as their perfectly tailored uniforms is a way, especially for American citizens, to have a greater sense of respect and pride for all that the uniform symbolizes and represents and what these service members do for the country.

"Is Black So Base a Hue?" An Examination of Aaron and Racial Dynamics in *Titus Andronicus*

William Prigge
Dr. Fran Teague, Theatre & Film Studies, Franklin College of Arts & Sciences

Since the seventeenth century, critics have denigrated Shakespeare's *Titus Andronicus* for its excessive violence, both physical and linguistic, so much so that in 1687 Edward Ravenscroft decided to adapt the play into a much tamer version that superseded Shakespeare's in performance for over a century. Amid critics' ever-present discussion of the atrocities of the play, however, the more important issue of race is often overlooked; in the character of Aaron the Moor, the play's main antagonist, Shakespeare presents a racial Other who revels in his Other-ness, allowing for a variety of interpretations in performance. As such, Aaron serves as the focal point of my research, an instrument and exemplar of racial relations. After searching the play's production history, I narrowed my scope to three stagings of special interest: Ira Aldridge's 1849 rewrite, Dieter Reible's 1970 Cape Town production (in which a white actor plays the role of Aaron), and Gregory Doran's 1995 *Titus Andronicus* in Johannesburg. Examining first-person accounts of specific performances and production notes from people involved in the creative process—particularly in regards to the portrayal of Aaron and his race as compared to others around him—revealed three radically different interpretations. These interpretations range from Aaron as protagonist to a focus on absolute segregation to a somewhat unclear reflection on the arbitrary nature of race. Nonetheless, all three hold a message for the societies in which they were performed, ultimately pointing to the artifice of racial division and questioning such social constructs in three separate cultures.

Abstracts

Discover Life Mothing Project

Cameron Prybol, CURO Summer Fellow
Dr. John Pickering, Odum School of Ecology

Weather patterns and seasonal cycles are known to play major roles in insect development and regulation, although there is little data to understand how various climate shifts may affect species populations. Lepidoptera are an incredibly diverse taxon, with 165,000 known species and an estimated 100,000 species yet to be described. They are also easy to work with, as they are harmless, attracted to lights, and readily identifiable from photographs. Study sites have been established in Athens, GA and Monteverde de San Luis, Costa Rica to sample Lepidoptera populations on a nightly basis. The Athens site, established in Spring 2010, has collected 87,404 data points to date, 66,650 of which have been identified to 856 species. The Costa Rica site, established in May 2012, has collected 49,858 data points to date, 20,822 of which have been identified to 606 species. Nightly data is collected by photographically documenting each specimen present at each study site. Photos are uploaded to the DiscoverLife database and identified to species, providing safe, efficient, and reliable data storage and analysis. Data is compared to local weather station readings and evaluated across years to show species distribution, relative abundance, phenology, and voltinism. These sites are providing insight into how weather patterns affect species in both temperate 4-season climates and tropical dry/rainy-season climates. Understanding the intricate behavior of insect life cycles holds tremendous implications for agriculture (pest insects), public health (disease vectors), and conservation (population health).

Extending Genetic Methods to Members of the Genus *Caldicellulosiruptor*: Use for Metabolic Engineering Biofuel Production from Biomass

Alyse Ragauskas
Dr. Janet Westpheling, Genetics, Franklin College of Arts & Sciences

Members of the bacterial genus *Caldicellulosirptor* are thermophilic anaerobes that grow optimally at 78°C and are the most thermophilc cellulolytic organisms known. Members of this genus vary in their ability to use different types of unpretreated lignocellulosic biomass and have the potential to produce biofuels and chemicals directly from plants like switchgrass and populus. Our lab recently reported the first methods for genetic manipulation of *C. bescii* and here we report methods for extending those genetic methods to other members of the genus. We have isolated a spontaneous deletion of the *pyrF* gene in *C. hydrothermalis* allowing genetic selection of transformants and engineering of this strain. We generated the mutant by growth at four different temperatures 55°C, 60°C, 68°C, and 75°C and after growing the cells to the same density, the cells were plated on uracil (required for a *pyrF* deletion) + 5-FOA that selects against the wild type copy of *pyrF*. The mutants are 5-FOA resistant and uracil auxotrophs allowing selection and counter selection of the wild type *pyrF* gene. PCR was used to screen mutant colonies for deletions and we identified one with a 100bp deletion. We will use a plasmid vector containing the wild-type *C.bescii pyrF* gene to establish transformation protocols for *C. hydrothermalis*. This strain has some advantages for metabolic engineering for ethanol production and our ability to genetically manipulate this strain will allow us to investigate its use for biofuel production.

Abstracts

Democratic Peace Theory-An Accurate View or Team Alliance

Nicholas Ramos-Franklin
Dr. Andrew Owsiak, International Affairs, School of Public & International Affairs

Democratic Peace Theory is a prominent aspect of International Relations claiming that democratic states do not engage in interstate warfare. The theory is furthered by scholars such as Francis Fukuyama and Immanuel Kant who state that democracy is the highest level of political development, that eventually states will converge on this government type, and that world peace will be extant. This paper will attempt to determine if this theory is relevant only with democracies, or if there is empirical evidence supporting a Communist or Socialist Peace Theory. The paper also attempts to test the Democratic Peace Theory by focusing on alliance politics and more specifically the idea that democratic governments face a common ideological enemy in communist and socialist states. The paper will explore this topic by case study analysis of interstate warfare in the last 80 years. The paper also will compare and contrast warfare between states with the same government type and create a statistical analysis of the occurrence of war between states with the same form of government. This paper is important because it introduces the viability of peace theories in various government forms and poses the possibility that democratic peace depends on the alliance against competing forms of government. Finally, the paper raises the question that, if all states were democratic, would conflict arise for other reasons because there is no longer a common enemy in government types?

Algae Biomass Production Using Compost Leachate Water and Evaluation of Biomass Harvesting Techniques

Nicholas Richwagen, CURO Summer Fellow
Dr. K.C. Das, College of Engineering

Algae-derived biofuels, possible alternatives to fossil fuels, are presently too costly for widespread use. Costs associated with algae production and harvesting have to be minimized for algae biofuels to be economically viable. Waste-water sources can be rich in nutrients and easy to obtain, and are therefore a desirable alternative to constructed media for algae growth. Additionally, filtering collection methods could potentially lower the costs of harvesting. A local leachate-pond provided sufficient nutrients for algal growth, and indigenous algae strains were explored for growth potential. Pond growth was monitored by daily optical density and total suspended solids (TSS) tests. The leachate water and its algal community only provided substantial biomass when regularly supplemented with conventional green algae species. Prepared filtration collection systems showed mixed benefits over the centrifuge. Incidental herbivorous organisms (rotifers*, chironomid larvae*) had a detrimental effect on growth. The leachate water and its indigenous alga community could not provide the desired biomass on its own. Further work with filter harvesting could support using filter systems at certain production scales. Problems with microherbivores reflect problems faced in algeaculture worldwide with antagonistic organisms.

Identifying Possible Roles for Structural Proteins in Thymus Morphogenesis

Krista Ritchie
Dr. Nancy Manley, Genetics, Franklin College of Arts & Sciences

Foxn1 positive thymus and Gcm2 positive parathyroid originate from third pouch endoderm. While it is known that this endoderm first resembles columnar epithelium, tissue structure changes as the thymus and parathyroid undergo morphogenesis, and little is known about how structural proteins are involved in these changes. My preliminary work shows that Z0-2 and Integrin beta-2 are present in the thymus. By observing changes in these

proteins, possible roles have been identified throughout thymus development. My results show that Integrin beta-2, a cell-surface protein, may have specific functions in TECs at later stages, which suggests that the protein could be required for cell adhesion during T-cell differentiation and/or thymocyte migration. Z0-2 is a structural protein found in epithelial cell junctions. By co-staining Z0-2 with a variety of cell markers, it can be concluded that the prenatal structure changes from cell clusters to a postnatal vasculature-type structure. In the present study, data has been collected to determine the presence of both Integrin beta-2 and Z0-2 in TECs, thymocytes, vasculature, or cell subpopulations of the thymus in order to support the working hypothesis that these structural proteins have specific roles during thymus development.

Melt Inclusion Study of the East Fork Rhyolite Member of the Valles Caldera, New Mexico

Abigail Saenger
Dr. Michael Roden, Geology, Franklin College of Arts & Sciences

Volcanic eruptions are a major societal threat in the western US, as well as around the world. The study of magmatic melt inclusions trapped in igneous crystals can record the events that trigger explosive eruptions, such as mixing of mafic and felsic magmas. Valles Caldera, NM was the site of a catastrophic eruption at 1.14 Ma, followed by eruption of the East Fork Rhyolite (EFR) lava domes and pumices between 55 and 40 Ka; these relatively younger eruptions may be precursors for a more catastrophic eruption. In order to determine whether magma mixing occurred in the EFR magma chamber, I analyzed the chemical composition of melt inclusions within plagioclase grains in samples taken from lavas and pumices of the EFR. Melt inclusions represent melt trapped at the time of the host grain crystallization, and evidence of two melt compositions should be preserved if magma mixing occurred. I analyzed the inclusions using the electron microprobe in the UGA Department of Geology. Melt inclusion concentrations of FeO, Al2O3, MgO, CaO, Na2O, and K2O were plotted against SiO2 and compared to the plagioclase compositions in order to preclude contamination from the host grain. Textures such as hornblende-rimmed orthopyroxene and sieve-textured feldspars are evidence of chemical disequilibrium, which can be an indicator of magma mixing. However, oxide variation diagrams for the melt inclusions do not show a clear bimodal grouping expected from the presence of two melt compositions. These geochemical data suggest that simple magma mixing was not a significant process within the EFR.

The Epistle of James: Discovering its Conception of Faith and Works and its Call for Social Justice

Adam Samples
Dr. Wayne Coppins, Religion, Franklin College of Arts & Sciences

The Epistle of James is one of the seven Catholic Epistles in the New Testament, traditionally attributed to James the Just, the brother of Jesus. The epistle's teachings on faith and works have been among the most debated theological issues in Church history. In my research, I will look to the historical and literary context to understand the distinctive voice of James regarding faith and works, and I will also investigate his call for social justice. James' ideas regarding faith and works, his egalitarian, communistic worldview, and his idea of the "true religion" (James 1:27), I will argue, express a universal call for a reversal of traditional social constructs. It becomes clear that when one truly assesses the importance of James, it has a broader and more significant role in defining the Christian life than has often been credited to it; moreover, rather than being confined to the religious sphere, the epistle can be seen as

a valuable resource for the broader task of addressing social justice in today's world.

Chinese Foreign Direct Investment in the United States: A New Game

Aveek Sarker, CURO Honors Scholar
Dr. William Keller, Center for International Trade & Security, School of Public & International Affairs

In the past, foreign direct investments flowed predominantly from the "developed world" to the "developing world." Those flows are continuing, but China is now taking a lead role in seeking to invest in ventures around the world through mergers, acquisitions, and greenfield investments. Current trends indicate more than 1 trillion dollars in direct Chinese investment will flow worldwide by 2020, a significant share of which will be destined for advanced markets such as the United States. Chinese firms have already established operations in 35 states and across dozens of industries including energy, telecommunications, and industrial machinery, creating approximately 30,000 jobs. How the United States responds to this new reality will have enormous consequences for its own economic future and for both its business and political relationship with China in this new era of global finance. In undertaking this study, my purpose is to better understand the broader implications of increasing amounts of Chinese FDI in the United States and across the world to determine how they will affect the geopolitical balance of power in the near future. My methodology includes compiling time series data to analyze the distribution of investments by region, sector, and industry in addition to examining specific case studies and business deals to evaluate the various benefits and security risks that such incoming investments pose. By doing so, I will have contextualized the many implications of this emergent trend- one that will work to define the socio-political relationship of the world's two largest economies in the coming decades.

The Future of Lyme Disease: Virulence Determined by Climate

Scott Saunders
Dr. Andrew Park, Odum School of Ecology

How will vector-borne diseases change in the future under different climate change scenarios? Lyme borreliosis is the most prevalent vector-borne disease in North America and is caused by the bacteria *B. Burgdorferi*. The bacteria is spread and maintained in hosts by a vector, the black-legged tick, *I. Scapularis*. There are many different strains of *B. Burgdorferi* that generally employ either a 'rapidly clearing' or 'persistent' strategy when infecting hosts, and there is an existing model that simulates competition between these two phenotypes in a host population. The outcome of this competition depends on the difference in activity between the larval and nymph stages of *I. Scapularis* in a given season. This time delay is best predicted by the amplitude of the annual temperature cycle of a given region. Although previous studies have examined future distribution of ticks and host species, none have examined the future distributions of the different bacterial strains. Using climate predictions for the Southeast for the year 2050, this project connects these components and creates a map of predictions for the strain of *B. Burgdorferi* for each county. This data will be useful because only the persistent strains of bacteria are commonly associated with human Lyme disease cases. Early results show that most of the Southeast should favor bacteria with 'persistent' phenotypes, yet currently this region reports few incidences of Lyme borreliosis in humans.

Non-canonical CaaX Motifs Can Drive Protein Isoprenylation

William Saunders III, Colby Ruiz, CURO Honors Scholar
Dr. Walter Schmidt, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

This study explores the possibility of longer non-canonical CaaX motifs. Based on the findings of Kho, et al. it was hypothesized that longer CaaX motifs may be biologically relevant. A thorough understanding of CaaX proteins and how they are post-translational modified is important because CaaX proteins are of significant biomedical relevance. For example, mutated Ras proteins, members of the CaaX family, are associated with 90% of pancreatic cancer, 50% of lung cancer, and 30% of all cancers in humans. This study was conducted using yeast as a model organism and the production of a-factor as a reporter to investigate the functional potential of extended CaaaX motifs. Over the course of the study, nearly 40,000 recombinant colonies were screened and 24 of those colonies tested positive for production of a-factor. Upon retesting to validate the positive hits, only eight retested positive. Based on the collected data, it appears that the longer CaaaX motifs may be biologically relevant.

Using Next Generation Sequencing to Identify Unique Sequence Types Associated with Gravidity-based Immunity in Placental Malaria

Stephen Scott
Dr. David Peterson, Infectious Diseases, College of Veterinary Medicine

Even with a global effort to eliminate malaria, the disease caused primarily by the parasite *Plasmodium falciparum* continues to threaten entire regions of the world, particularly pregnant women and newborns living in sub-Saharan Africa. In 2010 alone there were 215 million clinical cases and 655,000 reported deaths due to malaria. In pregnant women, *P. falciparum*-infected red blood cells accumulate in the placenta by adhering to receptors on fetal cells called synthiotrophoblasts. The parasite ligands and host receptors that mediate cytoadherence have been extensively investigated, resulting in the discovery of a protein encoded by a single member of the highly polymorphic *var* gene family called *var2csa*. During placental malaria (PM), *var2csa* mediates binding of infected red blood cells to synthiotrophoblasts in the placenta. We have recently completed a project assessing the *var2csa* diversity in Kenyan placental samples, which has important implications for the development of immunity to PM. We used nested PCR and applied high-throughput DNA sequencing and bioinformatics analysis to these samples for which clinical information including placental pathological state are known. As a result, we were able to identify gravidity associated immunity and unique sequence types. This information will be critical for the development of a PM vaccine.

***Pseudo-nitzschia* in the Diet of *Paraprionospio pinnata*, a Polychaete in the Gulf of Mexico Hypoxic Zone: Potential Mechanism for Toxin Bioaccumulation**

Chelsea Sexton
Dr. James Byers, Odum School of Ecology

Anthropogenically-derived riverine nutrients stimulate spring phytoplankton blooms, including the potentially toxic diatom *Pseudo-nitzschia spp.*, over the continental shelf waters in the northern Gulf of Mexico. Cells of *Pseudo-nitzschia spp.* that are not grazed in the upper water column sink to the seafloor and likely contribute to the carbon that fuels bottom-water hypoxia. Opportunistic polychaetes are essential members of the marine benthic community in areas affected by low oxygen conditions. With better survival in hypoxic bottom conditions (≤ 2 mg L-1 dissolved oxygen) than most infauna, they play a year-round role in benthic-pelagic

coupling and transfer of organic matter to upper trophic levels. We collected the polychaete, *Paraprionospio pinnata* at a station 100 km west of the mouth of the Mississippi River monthly from Aug 2003 to Oct 2004 to determine their gut contents. *Pseudo-nitzschia spp*., which are capable of producing the neurotoxin domoic acid, comprised 2.8% ± 1.0% (n=27) of the total diatoms consumed per polychaete. The presence of intact cells of *Pseudo-nitzschia spp*. on the sediments and in *P. pinnata* gut contents supports the inference of the dominant polychaete in this hypoxic area as a potential vector of domoic acid to upper trophic levels.

The Unpublished Letters of Elizabeth Bishop

Fiona Sheehan
Dr. Susan Rosenbaum, English, Franklin College of Arts & Sciences

Elizabeth Bishop was one of the most important poets of the 20th century, yet she only published 100 poems in her lifetime. Most of her biography comes from her letters. My grandmother, Rhoda Wheeler Sheehan, and Bishop were lifelong friends, and Rhoda was one of her closest friends during the last decade of Bishop's life. My research examines the biographical and literary significance of 49 unpublished letters and postcards from Bishop to my grandmother, sent between 1969 and 1979. Additionally, this collection of correspondence is one of the largest from this period in her life. I will summarize research from my directed reading through a PowerPoint with slides of Bishop, Rhoda, and several key letters. I analyzed their literary and biographical significance, researched my grandmother and Bishop's relationship, and researched scholarly opinion of letter-writing and postcards as an art. I found that at times Bishop used correspondence to generate material for her poems and to engage her correspondents in a collaborative, creative effort. Additionally, my letters are artful in their own right: many poetic descriptions and even a drawing are woven into Bishop's letters, something rare for her to include in correspondence. The letters also provide insight into events Bishop was thinking about at the time—from Indian land settlement claims to US space laboratories falling to earth. This semester I continue my research in the form of a senior thesis. This summer I will write and submit my research for publication.

Effects of the Amazon River Plume on Subsurface Waters: Measuring the Effectiveness of the Plume's Uptake of Atmospheric CO_2

Megan Sheehan
Dr. Patricia Yager, School of Marine Programs, Franklin College of Arts & Sciences

The Amazon River plume is an important biological pump for the Atlantic Ocean, acting as a sink for atmospheric CO_2, and providing an important mechanism to counteract increasing amounts of CO_2 in the Earth's atmosphere. This study is centered on the question of how effective the plume is in sequestering atmospheric CO_2. To quantify this, water samples were taken from the plume's surface and subsurface waters. Bacterial respirations were measured from this water by measuring the amount of dissolved inorganic carbon available in the water after incubation. This study is proposing that the surface plume bacterial respiration rates are affecting the subsurface plume bacterial respiration rates. If indeed there is a trend between the surface and subsurface bacterial respiration rates, this will be an indicator that the bacteria at the surface of the plume are sinking atmospheric CO_2 and the subsurface bacteria are using it. Surface respiration rates within and around the plume have already been analyzed and show a strong relationship between bacterial respiration rates and salinity of the water. Low salinity water, or freshwater, has high respiration rates, and high salinity water, or ocean water, has lower respiration rates. The remaining subsurface

bacterial respirations will be compared to the surface respiration rates, and a trend between them will be determined. If there is no trend, then other factors, such as chlorophyll and nutrient availability, will be examined with the respiration rates in order to see if another relationship is available between the surface and subsurface plume waters.

Searching for the Minimal Segment of Alpha Toxin Necessary for Binding to GPI-anchored Proteins on Cancer Cells

Collin Shumate
Dr. James Pierce, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Ovarian cancer is one of the more difficult cancers to diagnose because symptoms do not arise quickly and because tests are currently quite invasive for a simple check-up. Our research aims to contribute to diagnostics of cancer by exploiting the differences in cancer cells from healthy cells. Cancer cells over-express genes that cause the cells to produce certain GPI-anchored proteins, which anchor to the outside of cells. Because the genes are over-expressed, GPI-anchored proteins are elevated in these cancers, such as breast carcinoma and ovarian cancer. Alpha toxin is a protein of interest that binds to GPI-anchored proteins. It is structured similarly to aerolysin and they function and bind to GPI-anchored proteins much in the same way. I am using PCR amplification of the alpha toxin DNA to produce a variety of lengths of alpha toxins to perform binding assays with GPI-anchored proteins. Our research aims to find the minimal portion of alpha toxin needed to bind to GPI-anchored proteins so that diagnostic assays can be developed by taking advantage of alpha toxin without the toxic functionality being expressed.

Self-control in the Workplace: The Relationships between Self-control and Perceived Task Difficulty

Lane Siedor
Dr. Michelle vanDellen, Psychology, Franklin College of Arts & Sciences

Recent research suggests that managers delegate more tasks to people with high self-control. Furthermore, they are less likely to reward people with high self-control for high quality work. The purpose of the present work was to test the hypothesis that managers underestimate how difficult tasks are for people with high self-control. Participants (N = 120) were recruited from an undergraduate research pool. Participants were randomly assigned to either an actor role or an observer role. The actor was designed to simulate an employee and the observer to simulate a manager. Both participants completed questionnaires that provided background information and a typing task, in which they followed complicated instructions in retyping a text. The actor completed an eight-minute version of the typing task while the observer typed a brief paragraph, enough exposure with the task to assess how hard the full-length version might be for someone else. Then, the observer was given false information about the actor's self-control and asked to make predictions about how difficult the typing task was for the actor. The self-control information was randomly assigned so that half of the actors were presented as having high and half as having low self-control. Additionally, actors reported how difficult they found the task and we assessed their state self-control levels objectively using a Stroop task. Preliminary results support our hypothesis. The observers thought the task was easier for actors believed to have high (vs. low) self-control. However, actors with high and low self-control reported the task to be equally challenging.

Abstracts

Characterization of an RNA-protein Immune Complex Functioning in Prokaryotic Viral Defense

Cole Skinner, CURO Honors Scholar, CURO Summer Fellow
Dr. Michael Terns, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

CRISPR-Cas (Clustered Regularly Interspaced Short Palindromic Repeats – CRISPR associated) systems provide bacterial and archaeal organisms with genetically based, heritable defense from nucleic acids of viruses or other genomic invaders. In a CRISPR-containing host, Cas proteins bind invader-derived crRNAs (CRISPR RNAs) produced from the CRISPR locus to form crRNPs (CRISPR ribonucleoproteins), which provide the primary line of defense against invaders. At least ten structurally and functionally diverse CRISPR-Cas immune systems have been discovered that each consist of specific Cas proteins and associated crRNA species. The objective of my work is to characterize the structure and function of a previously uncharacterized immune system (the *Tneap* complex) from the hyperthermophilic archaeaon, *Pyrococcus furiosus*. Our evidence indicates that the *Tneap* complex is comprised of four Cas proteins (Cas5t, Cst2, Cst1 and Cas3) and a specific crRNA form that has a functionally important sequence element (called the 5' tag). To gain a detailed understanding of the structural organization and function of the *Tneap* immune complex, we attempted to reconstitute these complexes *in vitro* from recombinant, purified *Tneap* Cas proteins and synthetic crRNAs. Using native gel electrophoresis mobility shift assays, I observed 5' tag-specific binding of the *Tneap* proteins to a crRNA to form specific crRNP complexes. Moreover, I found that the assembled crRNP stably associates with complimentary DNA targets (that mimic viral sequences). Further characterization of this CRISPR-Cas system could contribute to ongoing work to develop CRISPR-based technologies with important industrial and biomedical applications.

Multiple Marlows: Intertextuality and Irony in Conrad's Marlow Tales

Samuel Smith
Dr. Adam Parkes, English, Franklin College of Arts & Sciences

Joseph Conrad wrote four texts featuring Charles Marlow as a first-person narrator: "Youth" (1898), *Heart of Darkness* (1899), *Lord Jim* (1900), and *Chance* (1914). Conrad's redeployment of Marlow raises several questions. How does Marlow function as both a narrator and a character in each individual text? How are each of his incarnations related to those in the other three works? To what degree is it valid to read the Marlow of one text as being continuous with the Marlow of another? All of these questions deal with intertextuality, a theoretical concept that is concerned with the way in which—and the extent to which—texts depend on other texts to generate meaning. I will approach these questions by investigating Conrad's use of Marlow as an ironizing narrator and an ironized character, both in each text and in the collection of these four texts. I see Conrad's redeployment of Marlow as a conscious move to separate the Marlow texts from his other works, effectively indicating that we should read them together. However, at the same time, Conrad's decision to create four works that can stand on their own indicates that they can and should be read on their own as well. I will argue that while both ways of reading the four Marlow texts are valid, holding each reading in tension with the other produces an effect that deepens the ironic meanings of both the individual texts and the ironic project that is the collection of the four texts.

Abstracts

The Black Youth Vote in the 2012 Presidential Election: Disillusioned or Reenergized?
Elijah Staggers
Dr. James Bason, Vice President for Research Services, Vice President for Research Units

This research project investigates the political attitudes of the black youth vote in the 2012 Presidential Election between Barack Obama (D) and Mitt Romney (R). Research suggests that African American youth voters recorded the highest increase in voter turnout during the previous 2008 Presidential Election. I will attempt to establish a continued trend in voter political participation and optimistic political attitude of this demographic for the 2012 presidential election. I will also attempt to prove the existence of a "shared identity" between Barack Obama and the minority youth vote. This specific question will also shed light on a larger political question, whether the debated success of Barack Obama's policies during his first term in office have disillusioned a voting bloc which he strongly retained in 2008. The method of this research involves the distribution of a survey to gauge the political attitude of the black youth vote approaching the 2012 Presidential Election. The data yielded evidence to suggest a continued trend in African American youth voter support of Barack Obama, with 67% of African American youth describing their political attitude as "enthusiastic," 76% of African Americans viewing Barack Obama's first term policies as successful, and 95% of African Americans youth holding a "shared identity" with Barack Obama. This research demonstrates that despite criticism of Barack Obama's policies, the African American youth demographic still unilaterally supports him. Moreover, it reveals a trend in voting behavior, evidencing a positive correlation between that high level of support and a "shared identity" and political attitude.

Body Size and Temperature: A Report on Moth Activity in Clarke County
Victoria Staples
Dr. John Pickering, Odum School of Ecology

Because insects are ectotherms, their activity depends on temperature. We hypothesize that the flight activity of smaller moths will be more affected by temperature than the flight activity of larger moths. To test this hypothesis, a data set of 71,000 photographs of moths will be analyzed. In this study, a community of moths was attracted to a study site in Clarke County, Georgia and documented nightly, in photographs, for two years. Of these photographs, 93% of moths have been identified to more than 850 species, and most photographs contain rulers from which wing size may be measured and used as a proxy for body size. We will present an analysis of this data set and a weather data set collected by weather stations at the Ben Epps Airport and in Winterville, Georgia to correlate body size and flight activity with temperature. A natural experiment such as this may aid in the understanding of moth communities as they are affected by global climate change.

Sitcom Technology through the Ages
Jared Stepp
Dr. Fran Teague, Theatre & Film Studies, Franklin College of Arts & Sciences

Media technology has changed drastically over the years; we've gone from hand cranks and film reels to computers and digital effects, grainy black and white to vivid high definition, and each day we build new technologies that promote innovation and bolster the creativity that we see on television from the comfort of our own homes. My project is to track these changes through the use of Russell Special Collections Library's Peabody Award winners, to create a standard for comparison. Our favorite shows like *Modern Family* use these developing technologies to enhance their storytelling. My

area of focus is the technology used at the time, and how it shaped the potential of the show—if the show was filmed in front of a live audience, the opportunities for quick camera maneuvers are lost; if the show is recorded in high definition, special considerations need to be undergone for makeup and costume design, etc. Sitcoms are one of the greatest flagships for our history; they represent the trials we face in our modern lives. The area of relevance to current events helps signify the state of technology and the limits that are held within. I recorded a digital narrative to show the progression of many features, including several scenes that best represent them. I begin with the early stages of single-shot studio audience sitcoms and progress to modern day multi-camera sitcoms, closely analyzing the range of camera, sound, directing, and acting capabilities brought forth by the developments in sitcom technology through the ages.

Developing Methods to Locate and Survey for Rare Species: a Case Study Using the Endangered Bog Turtle (*Glyptemys muhlenbergii*)

Theresa Stratmann
Dr. John Maerz, Warnell School of Forestry & Natural Resources

North America's smallest turtle, the bog turtle (*Glyptemys muhlenbergii*), is listed as threatened under the Endangered Species Act, mainly due to habitat loss and deterioration. Cryptic and rare, this species is difficult to find and consequently many states are still in the process of locating bog turtle populations. To aid this cause we are (1) developing a species distribution model (SDM) to better identify areas in the landscape suitable for bog turtles, and (2) use a mark/recapture study to determine the best trapping methodology and minimal effort required to estimate bog turtle presence/absence at a site, ultimately designing a step-by-step process for state agencies to locate and survey for bog turtle populations. A preliminary SDM, using MaxEnt, indicates that elevation, distance to wetland, slope of the landscape, and maximum temperature of warmest month are best at predicting suitable bog turtle habitat. By overlaying the model with topographical maps, satellite imagery, and known bog turtle sites, areas to survey will be located and prioritized. One season of mark/recapture data from 8 Georgia bogs, using a standard trapping density, shows that detection probabilities at the bog level, as calculated in Program MARK, ranged from 0.05 to 0.01. This detection probability will then be used to determine trapping effort required for each site. Combining these parts, this project gives state wildlife agencies an efficient methodology to locate and survey for bog turtles, but more generally, it is a case study that contributes to refining how biologists survey for rare and cryptic species.

For the Love of God: Damien Hirst and a Room with a Corpse

Emily Stubbs
Prof. Isabelle Wallace, Lamar Dodd School of Art, Franklin College of Arts & Sciences

In order to meaningfully reframe the issue of western religion in contemporary art, this paper explores the religious implications of Damien Hirst's work involving dead animals. Western religion and art have a long, flourishing history together. In the Age of Enlightenment, however, God became more abstract, the world became more secular, and production of religious art markedly decreased. In recent years, religion has become entirely estranged from the art world. Many artists and art historians claim that religion has no place in contemporary art. Despite such claims, there are a number of celebrated artists whose work clearly engages with religion. In *Postmodern Heretics: The Catholic Imagination in Contemporary Art*, Eleanor Heartney expounds on the relationship between postmodern art and the Catholic imagination. While there is validity to her argument, the framework Heartney lays out is

limited, not accounting for the entire picture. Although Damien Hirst's work confronts death as does Andres Serrano's *Morgue* series, Hirst's clean, scientific aesthetic, reminiscent of minimalism, seems diametrically opposed to the sense of Catholic morbidity that Heartney asserts in Serrano's work. Nonetheless, Hirst's work – in its use of dead animals, formaldehyde, and the vitrine – stages impulses that are religious. *The Physical Impossibility of Death in the Mind of Someone Living*, perhaps Hirst's most famous work, beckons viewers to reflect upon their own projections of death. Criticisms of Hirst's financialization of art notwithstanding, Damien Hirst's provocative engagement with western religion is significant of a much greater current within contemporary art that remains insufficiently examined.

The Characterization of F-actin/34kDa Binding Sites and Their Contribution to the Formation of Model Hirano Bodies

Connor Sweetnam, CURO Honors Scholar, CURO Summer Fellow
Dr. Marcus Fechheimer, Cellular Biology, Franklin College of Arts & Sciences

Hirano bodies (HBs) are paracrystalline inclusions that appear frequently in autopsied brains of those affected with neurodegenerative diseases. They have been shown to play a potentially protective role in disease pathways. HBs are composed of highly ordered actin filaments. Actin, both monomeric and filamentous, is a component of the cytoskeleton that is necessary for cell shape changes and movement. Actin filaments are regulated by actin binding proteins resulting in the dynamic organization of polymerized actin. Mutations in the 34,000-Dalton F-actin Bundling Protein (34 kDa) have been shown to induce the formation of model Hirano bodies in amoeba and mammalian cell culture models. We are interested in characterizing the sites of F-actin/34 kDa interaction in order to further analyze the biochemical basis of 34 kDa regulation of F-actin and the formation of Hirano bodies. We previously identified specific sites of interaction between the two proteins by chemical cross-linking, proteolytic digestion, and mass spectroscopy. Now, using techniques in molecular biology and protein purification, we have generated point mutations of the 34 kDa protein in three F-actin binding sites. We will study the effect of these alterations on F-actin/34 kDa binding. Further characterization of this interaction could help us understand the biochemical basis of the induction of Hirano body formation.

There's Another Side to the Story: Examining the Blacklist Resulting in the HUAC Hearings of the 1950s

Ashley Thompson
Dr. Fran Teague, Theatre & Film Studies, Franklin College of Arts & Sciences

In the 1950s, the House Un-American Activities Committee gained wide recognition for holding hearings and questioning people as to if they were members of the Communist Party. The media portrays this committee in a post-Cold War culture as heartless, due to their extreme measures for extracting information on affiliation with the Communist Party. However, every story has two sides, and I wanted to know how Americans could have participated in the 1950s witch hunts that destroyed so many lives. To answer my question, I conducted research in the Richard B. Russell Library for Political Research and Studies to learn what Senator Russell and his constituents thought of the Red Scare. Evidence demonstrates that Russell, as well as many other American citizens, had a genuine fear of warfare occurring between the United States and the Soviet Union. The measures now considered so extreme were actually a way for government officials to provide a protective barrier against Communist ideals. Materials examined include correspondence between Senator Richard Russell and his constituents

as well as submitted materials to the Senator. These materials include such items as comic books, newspapers, tracts, and sermons detailing the dangers of Communism. Results from this research provide evidence that no event in history is simple, and sometimes methods that may seem extreme after the fact were not only accepted, but encouraged at the time they originally occurred.

The Anti-Inflammatory Effects of Lipoic Acid on Inflammatory Cytokines

Lauren Titus, CURO Graduation Distinction
Dr. Nick Filipov, Physiology & Pharmacology, College of Veterinary Medicine

Dopaminergic cell death in the substantia nigra produces most symptoms of Parkinson's Disease (PD). While the cause(s) of this cell death is still largely unknown, numerous studies have demonstrated that reactive oxygen species and inflammatory cytokines, produced in activated microglial cells, damage neighboring dopaminergic neurons, possibly by triggering apoptosis. Microglia are activated by multiple factors, one of them being LPS, an endotoxin from gram(-) bacteria. My research focuses on the anti-inflammatory effects of lipoic acid (LA), an anti-oxidative fatty acid capable of passing through the blood-brain barrier. Because certain antioxidants also exhibit anti-inflammatory properties, I hypothesized that LA would decrease inflammatory cytokines produced by microglia. If neuroinflammation of microglia can be reduced by LA, then potentially the severity of PD could be lessened. In previous research, I pre-treated microglial cells with LA and then activated them with LPS. Using ELISAs and qRT-PCRS, I found that LA pre-treatment corresponds with significantly decreased transcription and expression of the cytokines TNF-α and IL-6, especially TNF- α. Western blots demonstrated that LA inhibited the activation of NF-ϰB, a key inflammatory transcription factor. My current research involves the surface molecule F4/80, which is upregulated upon microglial activation. Data from qRT-PCRs revealed that LPS significantly increases F4/80 transcription. LA (both alone and in conjunction with LPS) decreases F4/80 transcription by 15-30%, but this effect did not reach significance ($p \geq 0.10$). These results demonstrate that LA has effective anti-inflammatory properties, but its main mechanism of action occurs within the cell, not by upregulation of cell surface molecules associated with microglial cell activation.

The Women of *Richard III* Re-visited

Margaret Touchton
Dr. Lisa Bolding, English, Franklin College of Arts & Sciences

Based upon the War of the Roses, Shakespeare's historical tragedy *Richard III* is a play about the formation of the Tudor dynasty and the villain who nearly ruined it all. Many of the studies done on this play focus on the antihero, but few have focused on the women whose lineage gave birth to the female monarch, Elizabeth I. While some are quick to brush away the significance of the women in *Richard III,* there are echoes of Elizabeth's life and rhetoric in the roles Shakespeare created for her foremothers. Through analysis of the text, historical documents, Elizabeth I's speeches, and literary criticism, this study examines how various stages in her life are reflected in Shakespeare's portrayal of her foremothers' story. The play paralleled their transition from being powerless, to political tools, and finally gaining their own agency, like Elizabeth during her life. This correlation is unusual since during Shakespeare's time women had a subservient role to men. Even though England was ruled by a woman, there were few changes in the cultural attitude towards women. Thus the parallel between these women and a powerful queen not only suggests their importance in the play but also challenges societal norms by featuring strong women. The agency these women gain throughout the play has been overlooked by

existing scholarship and this study seeks to amend this problem.

Determining a Method for Pharmacologic Rescue of Mutations that Affect Tissue-specific Glycan Expression in *Drosophila melanogaster*

Brittany Truitt, CURO Summer Fellow
Dr. Michael Tiemeyer, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Protein glycosylation is essential for cell-cell signaling, cellular differentiation, and tissue formation, yet its regulatory mechanisms are highly unknown. While examples of cell and tissue specific glycosylation are abundant among all animal species, the fruit fly, *Drosophila melanogaster*, provides an excellent tool for discovering genes that might regulate this process. In a screen for mutations that disrupt neural-specific glycosylation, we identified a gene called sugar-free frosting (sff) that affects the expression of a particular class of glycans in the embryonic nervous system. Based on genetic interactions between sff and a gene involved in the biosynthesis of biogenic amine neurotransmitters, we hypothesized that pharmacologic treatment of sff mutant embryos with anti-depressant drugs might rescue neural glycan expression. Therefore, we undertook the development of a method for delivering drugs into the embryo. Such treatment is difficult because of the numerous layers that surround and protect the embryo. The waxy layer surrounding the vitelline membrane has proven to be an especially problematic layer because it is impermeable to small molecules. Our current approach involves the use of a previously identified embryo permeabilization solvent (EPS) containing limonene, alcohol, and a cocamide mixture which may dissolve the waxy layer. Using this technique, we have succeeded in allowing a small fluorescent dye to gain access to the embryo without affecting viability. The current goal of this research is to optimize a reproducible method to allow an assessment of the pharmacologic effects on tissue glycosylation.

The Role of Cognitive Tasks in the Conceptualization and Assessment of ADHD

Kelly Tucker
Dr. Janet Frick, Psychology, Franklin College of Arts & Sciences

Attention Deficit Hyperactivity Disorder (ADHD) is defined by the DSM-IV-TR as a behavioral disorder with an onset of hyperactive or inattentive symptoms that must be present prior to age seven. The DSM-IV-TR specifies that these symptoms must be present in two settings and, therefore, most children are diagnosed based on parent and teacher behavioral ratings. There is a need for objective cognitive-based tasks that clinicians could utilize to substantiate their diagnosis of ADHD in children. This literature review discusses the ways in which cognitive tasks may help to narrow the conceptualization of ADHD, as well as provide a more objective way of assessing the disorder in children. We reviewed literature that examined two models of conceptualizing the etiology of ADHD as due to deficiencies in working memory or inhibition. This literature review utilized these models as a framework to investigate laboratory-based tasks that are currently being researched as possible ADHD assessment techniques. We found recent evidence that supports the idea that ADHD is caused by deficiencies in working memory, as well as some evidence that speaks to the validity of tasks that test children's ability to delay gratification in detecting ADHD. This literature review integrates theoretical and empirical findings that may inform future research, and more specifically serve as background for the study of whether the inattentive and hyperactive subtypes of ADHD may be caused by two separate cognitive deficiencies.

Abstracts

Differential Expression of RGS Proteins During Neural Differentiation

Katie Tuggle, CURO Graduation Distinction
Dr. Shelley Hooks, Pharmaceutical & Biomedical Sciences, College of Pharmacy

G-protein coupled receptors are ubiquitous cell surface molecules that control an abundance of physiological functions. These include but are not limited to immune response, neurotransmission, muscle contraction, and cell proliferation. Regulators of G-protein signaling (RGS) proteins halt the G-protein signaling cascade by acting as GTPase-accelerating proteins and turning the G-protein back into its GDP-bound, inactive state. The goal of this study was to determine if RGS expression changes during neural differentiation. qRT-PCR analysis revealed the expression of RGS proteins is dynamically regulated as cells transition from a neural progenitor into a neuron, thus changing the signaling capabilities of their respective GPCRs. Characterizing the expression changes of RGS proteins and understanding how the cell alters the expression of these proteins is paramount in developing a comprehensive understanding of cellular function. Many genes of RGS proteins have high levels of CpG sites in their promoter region, which indicates the possibility of epigenetic regulation by DNA methylation. DNA methylation involves the activity of DNA methyltransferases (DNMTs) and results in the silencing of the gene. After treatment of neuroblastoma cells with a DNMT inhibitor, qRT-PCR revealed the upregulation of mRNA transcripts of many RGS proteins, suggesting DNA methylation plays a role in the regulation of these proteins. The study of the regulatory mechanism of RGS proteins provides insight into how RGS proteins can be targeted in the treatment of various diseases.

Major Clarity in a Minor Paradox: The Role of Mark 9:24 in Illuminating the Markan Conception of Faith in the Context of Discipleship

Lindsay Ullrich
Dr. Wayne Coppins, Religion, Franklin College of Arts & Sciences

"I believe; help my unbelief!" is the cry of a minor character in Mark's gospel, a father seeking Jesus' help in healing his possessed son. Scholars often interpret this verse, Mark 9:24, and the surrounding passage as evidence that the father is a substandard model of discipleship and faith. This paper argues that biblical criticism, specifically narrative criticism, reveals that it is better to interpret the father as a positive model that furthers Mark's development of what faith should look like in the context of discipleship. Examination of this verse consisted of studying the interplay of the characters presented and looking at the passage in the context of the larger narrative. Contemporary theories concerning minor character function and the Markan definition of faith informed the analysis. Findings indicated that Mark 9:24 functions to add a depth dimension to the flat portrayal of Mark's ideal discipleship presented in a later character. Markan faith has an allowance for struggle, and examination shows that the father not only helps reveal this but also functions as a positive model of Mark's ideal proper response to it, namely reliance on Jesus and, ultimately, God. This finding not only redirects current views of this passage in Markan scholarship but also puts a sharper focus on the depth Mark presents in his realistic portrayal of faith. This portrayal, in turn, contributes to the dialogue in religious circles and beyond concerning what faith and doubt mean as part of the human experience and how the tension between them should be handled.

Abstracts

Mechanism of Gap Junction Inhibitor Carbenoxolene (CBX) in Regulating Gap Junction Proteins in ECC-1 Cells

Michelle Uzor
Dr. Xiaoqin Ye, Physiology & Pharmacology, College of Veterinary Medicine

Embryo implantation is a prerequisite process for successful pregnancy in mammals. It requires a competent embryo, a receptive uterus, and synchronized communication between them. How a uterus becomes transiently receptive for an embryo to implant is still largely unknown. Our *in vivo* study shows that carbenoxolene (CBX, a gap junction blocker) prevents the upregulation of gap junction proteins alpha1 (*Gja1*) and beta 2 (*Gjb2*) mRNA levels in the uterus, and disrupts uterine preparation for embryo implantation in mice. The mechanism by which CBX blocks uterine transformation for implantation is unknown. We hypothesize that CBX inhibits the transcription of *Gja1* and *Gjb2*, the two prominent gap junction proteins in the uterus upon implantation, and prevents the cellular and morphological changes associated with the establishment of uterine receptivity. To test the hypothesis, human endometrial cancer cell line ECC-1 cells are cultured and treated with different concentrations of CBX (0, 1 μM, 10 μM, 100 μM, and 500 μM). The end points include *Gja1* and *Gjb2* mRNA levels determined using realtime RT-PCR, cell morphology determined by F-actin staining, and cell proliferation/death determined by Trypan blue staining and cell number counting. Data collected so far indicate that 500 μM CBX decreases the number of live cells, most likely due to increased cell death. I have mastered all the needed techniques, and the data from the other two end points are being collected.

Purification of Periostin for Future Protein Screening Assays

Tram Van
Dr. James Pierce, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Periostin (POSTN) is a secreted extracellular matrix protein that contains an EMI and four Fasciclin (FAS1) domains. The protein promotes cell adhesion, cell attachment, and spreading of osteoblasts. Previous studies indicate that tumor-specific glycosylation changes on periostin are potential biomarkers for breast and ovarian cancer. As periostin has an *N*-linked glycosylation site at the amino acid numbered 599, we applied the program named Clustal Omega to examine how conserved sequences of periostin excreted from humans, mice, and frogs are at the *N*-linked site in the fourth FAS1 of the C-terminus. The result showed that the *N*-linked glycosylation site of periostin is highly conserved from humans to frogs. The conservation of the *N*-linked site in periostin suggests structural and functional importance. We would like to purify periostin with tumor-specific glycosylation for future functional studies and for use in the development of diagnostic cancer detection assays. We are adding a His-tag into the C-terminal end of periostin using a PCR strategy. Success in doing so will yield a massive amount of purified proteins for future experimental purposes. Although we are still in the process of completing the expression of periostin, the results we have gotten so far have supported our hypothesis, and moving forward should yield positive results with a His-tag put on periostin.

Abstracts

A Critical Examination of Anglicanism in the Life of Laurence Sterne and its Implications within *Tristram Shandy*

Jacqueline Van De Velde, Foundation Fellow
Dr. Elizabeth Kraft, English, Franklin College of Arts & Sciences

It is no surprise that *The Life and Opinions of Tristram Shandy, Gentleman* by Laurence Sterne was once dubbed the "dirtiest novel in English." Sexual innuendo and scatological humor pervade the pages of the novel – and, unhappily by extension, the minds of the reader – from the very first pages of the book, as Walter Shandy mourns the moment of Tristram's untimely conception. From then onwards, a slew of jokes, wisecracks, and sly comments, each with highly-charged sexual undertones, sustain the narrative. However, Sterne's authorial indecency is made all the more shocking when viewed in the context of his profession: an ordained minister of the Anglican Church. For a clergyman to engage in such bawdy writing seems strange, if not altogether blasphemous, and critics have sought to make sense of Sterne's unseemly mixture of professions since *Tristram Shandy*'s publication. Despite extensive literary scholarship on the text, several bibliographical and textual questions remain unanswered. Does Sterne's work within *Tristram Shandy* build upon the work of his pre-literary career as a clergyman? Despite its bawdy nature, does it purvey a Christian, specifically Anglican, ethic? Through an exhaustive study of Sterne's biography, examination of the reception of *Tristram Shandy* and Sterne's *Sermons*; and close readings of the elements of Anglican theology that were promoted – or misinterpreted – within *Tristram Shandy,* I will answer these questions, yielding clarity to Sterne's own life and opinions, which then will serve a reader as a guidepost within the otherwise often confounding narrative present in *Tristram Shandy*.

Crossing the Threshold: British Integration Policy through Haifa Zangana's *Women on a Journey Between Baghdad and London*

Jacqueline Van De Velde, Foundation Fellow
Dr. Esra Santesso, English, Franklin College of Arts & Sciences

Over the past fifty years, the Muslim population in Europe has grown from tens of thousands to 16 or 17 million – or approximately one out of every twenty-five Western Europeans – in 2010. Projections show continued demographic growth before leveling off at 25-30 million people (or 7-8%) in 2030, and the increasing tactical importance of the Middle East and North Africa solidifies the West's need to successfully engage Muslim populations in order to strengthen its own peace, security, diplomatic missions, and economic interests. Western European governments have no choice but to examine and engage with their current Muslim population as a force both permanent and enduring. Governments around the world are desperately seeking the answer to this Muslim question: what factors encourage integration, and what should the state's role be within the integration process? In my paper, I will provide an answer to this question through exploring literature as testimony: examining Kurdish-Iraqi refugee Haifa Zangana's novel *Women on a Journey Between Baghdad and London*, which documents the lives of five Iraqi immigrants to London. In my paper, I analyze the extent to which each of the five characters integrates into society, searching for common trends which either encourage or discourage the process. At the conclusion of my paper, I will present a case study, useful within European domestic policy, identifying the behaviors that encouraged integration within literature and to suggest ways by which states can utilize policy to encourage the integration process.

Abstracts

An Analysis of the Effect of Phytase Phosphorous Absorption and Growth in Nursery Pigs

Emily Vermillion, CURO Honors Scholar
Dr. Robert Dove, Animal & Dairy Science, College of Agricultural & Environmental Sciences

Phytase is an enzyme that breaks inorganic phosphorous found in plants from its phytic ring into organic phosphorous that can be absorbed and utilized by the animal. Phytase is absent from pigs' gastrointestinal tract; therefore, pigs are unable to effectively absorb the inorganic phosphorus in their plant-based diet. To meet nutritional requirements, large quantities of supplemental phosphorous must be fed, or phytase must be added to the diet. When large amounts of phosphorous are added without phytase, substantial quantities of this phosphorous are still excreted. In this study, 24 nursery pigs of mixed gender are randomly assigned to 12 pens. There are 3 feeding phases which correspond to weeks 1-3 following weaning. There are two dietary treatments in each phase, one diet with phytase and one without phytase to serve as a control. Samples of the phase I diet, and phases II and III control and phytase diets are all analyzed to determine initial nutrients available. Fecal samples are collected from each pen at the end of each dietary phase and analyzed for excreted nutrients; thus, total absorbed nutrients can be measured. Additionally, pigs are weighed weekly to measure and compare growth rates of pigs. If phytase is added to the recommended diet, then pigs should be able to absorb more available phosphorous and thus grow at a faster rate. Our data will presumably affect nutritional composition of swine diets by reduction of phosphorous supplements and addition of phytase, thus improving overall nursery pig performance.

Capuchin Monkeys and Emotional Contagion: Displaying Affiliation towards Humans Who Imitate Them

Stephanie Villarreal
Dr. Dorothy Fragaszy, Psychology, Franklin College of Arts & Sciences

An expansive literature details the phenomenon of emotional contagion, or the matching of another's emotions and behaviors, in humans. Synchronizing behaviors with another may facilitate group cohesion and interpersonal relationships, because we tend to like people who match us. In the long term, this phenomenon may be adaptive because we are more likely to be generous and helpful towards those who match our behavior. Recent research supports the idea that emotional contagion exists in other species as well. This study looks into whether capuchin monkeys, like humans, display affiliation towards humans who imitate them by spending more time in proximity to, looking at, or exchanging tokens with a human that they "like" rather than another human. We will test seven male capuchin monkeys individually using these conceptualizations of "liking" to answer this question. In each of several sessions, for a five-minute period, we will videotape the monkey while one human imitates the monkey's actions and another human performs contingent, yet non-matching actions. Subsequently, we will code the monkey's behavior from video in playback mode, producing quantitative data (frequencies, durations) for statistical analysis. We hypothesize that the monkeys will tend to spend more time in proximity to, looking at, and exchanging more tokens with the imitator rather than the non-imitator. If the monkeys do not exhibit these preferences, this may suggest that capuchin monkeys do not prefer humans who imitate them, and thus that the phenomenon of emotional contagion is not present in this species.

Abstracts

Effective Organization of Complex Visual Information

Kylie Wagner
Prof. Julie Spivey, Lamar Dodd School of Art, Franklin College of Arts & Sciences

The conference poster is a popular medium used to display research results. An effective poster conveys the essence of its message in a compact, comprehensible format, with the integrity of its information as its top priority. However, creating such a poster can be difficult for the non-designer, and as a result many posters suffer from a severe lack of information organization, utilizing graphic gimmicks (e.g. drop shadows, text boxes, garish color schemes), that hinder the transfer of content to viewer. The consequence is a diminished impact of the presenter's work, and by extension, their own professional credibility. Using the conference poster as a case study, I will investigate visual and typographic devices that improve readability and legibility, such as line length, font choice and size, layout principles, and data arrangement. I will study contemporary research in the fields of visual communication, marketing, eye tracking and reading comprehension, and then synthesize these findings into a set of basic guidelines useful to non-designers. Once this process is complete, I will take pre-existing posters and re-design them, then conduct comparative tests such as survey and eye-tracking analyses to assess their effectiveness. The criteria for a poster's success will be based on the level of comprehension by its audience, as opposed to mere aesthetics. Visual communication has the potential to inform, educate, and persuade its audience. By determining what visual formula maximizes readability for intended viewers, we discover the most effective way to transmit complex content in a concise manner.

Navigating Sickle Cell Disease in Africa

Amelia Watson
Dr. Anne Marie Zimeri, Environmental Health Science, College of Public Health

Sickle cell disease (SCD) is caused by abnormal hemoglobin structure, causing deformed, sickled red blood cells that can clot easily. Globally, 7% of humans carry an SCD variant. Africa has high estimates of SCD-related mortality, particularly in children, but lacks reliable data to address the issue. Without relevant epidemiological data, providing medical aid to areas of greatest need is impossible. Systematic data collection allows countries to intensify efforts on areas that need most help; it successfully decreased incidence of other African diseases, including HIV/AIDS. Because SCD lacks relevant data, it continues to have high incidence and mortality rates. The research question is: what policy option will be best suited for this problem? Several different approaches were examined to determine this problem: status quo, premarital screening, and newborn screening. These were examined for cost effectiveness, decreasing SCD incidence, decreasing childhood mortality for SCD, and increasing SCD data collection. The best way found to decrease the high incidence of SCD-related deaths and collect the most data is to develop newborn screening in urban hospitals and rural clinics. Screening, paired with education, impacted childhood mortality in many other countries. US newborn screening resulted in a 68% reduction in SCD-related mortality (ages 0-3). Once diagnosed, caretakers can plan their families and raise them accordingly with education from health care providers and genetic counselors. Data, paired with education, is key to this process, as it allows states to allocate resources for preventative measures.

Abstracts

Associations between BMI and Folate Status of Normal Weight and Obese Women of Childbearing Age

Arielle Weekley
Dr. Dorothy Hausman, Foods & Nutrition, College of Family & Consumer Sciences
Dr. Lynn Bailey, Foods & Nutrition, College of Family & Consumer Sciences

Folate is a water-soluble B vitamin required for cell division and especially critical during periods of rapid growth. Sufficient folate status is important prior to conception to reduce the risk of neural tube defects (NTD) during early embryonic development. NTDs result from incomplete closure and exposure of the central nervous system and currently affect approximately 300,000 pregnancies worldwide. The prevalence of NTDs has decreased in the US since 1998, when the FDA set folate fortification requirements in enriched cereal-grain products; nonetheless, the risk of having a NTD-affected pregnancy is up to threefold higher for obese mothers than for normal weight mothers. To examine associations between folate biomarkers and obesity status, we performed a secondary analysis of baseline folate concentrations and body composition parameters from a recent study conducted on normal weight and obese women of childbearing age. While accounting for each participant's total folate consumption, overall calorie intake, and age, we determined a significant inverse relationship between body mass index (BMI) and serum folate and a direct relationship between BMI and red blood cell folate. This evidence suggests that the current RDA for non-pregnant women (400μg DFE [dietary folate equivalents]) should be revised and adjusted based on BMI measurements to support NTD risk reduction.

Where Chemistry Meets the Classics: First-ever Modern Scientific Analysis of Pompeiian Polychrome Sculptures

Richard Weimar III
Dr. Tina Salguero, Chemistry, Franklin College of Arts & Sciences
Dr. Mark Abbe, Lamar Dodd School of Art, Franklin College of Arts & Sciences

The white marble of ancient Greek and Roman sculpture and architecture was originally vividly colored. This polychromy was first demonstrated with the 'Treu Head' in 1889; since then, archaeologists' and historians' view of the ancient West has become much more colorful. However, until the development of modern scientific technologies, the analysis of these masterpieces was limited largely to stylistic and historical approaches. Despite the huge wealth of information and insight that becomes available with state-of-the-art analytical chemistry techniques, their application to archaeological artifacts has not been refined or widely applied. The highly multidisciplinary studies described in this work–The Oplontis Project and The Orpheus Relief Project–seek to establish scientific analyses as integral to further advances in the fields of archaeology and art history. In doing so, we seek to set a new, high standard for future contributions and to robustly establish a fruitful intersection between the physical sciences and the humanities. This particular work encompasses our technical findings on the first-ever scientific analysis of polychrome statues in the Gulf of Naples, along with findings on an ancient polychrome Roman relief currently on loan at the Georgia Museum of Art. The techniques used include micro-Raman spectroscopy, near infrared luminescence spectroscopy and polarized light microscopy. Through our results, we can accurately appraise the sculptures' authenticity, sociopolitical significance, and historical context. Additionally, we can inform conservation methods and generate virtual replicas that are faithful to the cultural

heritage of one of the most influential civilizations ever known.

Justice for All: The Vitality of Addressing Judicial Structures during Reconstruction Period

Patrick Wheat
Dr. Andrew Owsiak, International Affairs, School of Public & International Affairs

After an ethnic conflict, a state undergoes a reconstruction period that can be characterized by either a general increase or decrease in hostilities between different factions. If the increase in hostilities is not addressed, it is likely that war can break out again in the state. To ensure that there is not an increase in hostilities, the role of the government during this period should be focused on the reestablishment of an unbiased judicial system and law enforcement agencies. The reason for this is because during the first few months of reconstruction, ethnic factions will likely be hostile and unwilling to accept opposing ethnic factions. Through the judicial system, the government will be able to establish a "rule of law" that is fair to all ethnic groups. By doing this, the government should be able to act as a mediator by addressing individuals, not ethnic groups, who committed crimes against each other. This will allow for a better chance of reconciliation between ethnic groups during this period as a result. To demonstrate this possibility while also discussing potential obstacles within both the government and society to effectively reconcile ethnic factions, I will be discussing the situations in several nations, including Bosnia and Herzegovina, Rwanda, and Kyrgyzstan.

Investigation of the Mechanism of Bile Acid-induced Prostate Cancer Cell Death

Stephanie Wilding, CURO Summer Fellow
Dr. Brian Cummings, Pharmaceutical & Biomedical Sciences, College of Pharmacy

Bile acids mediate the digestion and absorption of fats and fat-soluble vitamins; however, pathological increases are associated with choleostasis and cell death. Recent studies show that high concentrations of bile acids can induce apoptosis in several cells, including cancer cells, by mechanisms that are not fully understood. The goal of this study was to determine the mechanism of toxicity of three different bile acids (chenodeoxycholic acid, deoxycholic acid, and lithocholic acid) in prostate cancer cell lines (PC-3, LNCaP, and DU-145). Based on reports that bile acids increase the expression of inflammatory enzymes called secretory phospholipase A2 (sPLA2), we tested the hypothesis that these enzymes regulate the mechanisms of bile acid-induced cell death. Analysis of sPLA2 expression using quantitative PCR showed that several sPLA2 isoforms were expressed in PC-3, LNCaP and DU-145 cells, including Group IB, IIA, V and X sPLA2. Nevertheless, treatment of cells with the sPLA2 inhibitor LY311727, prior to exposure to bile acids, did not alter MTT staining compared to cells exposed to bile acids alone. Similar results were seen with the calcium-independent PLA2 (iPLA2) inhibitor bromenol lactone. Other reports suggested that bile acids had a role in oxidative stress, so the antioxidants glutathione, N-acetyl cysteine, and ascorbic acid were tested. Dosing the cells with these antioxidants prior to bile acid exposure did not alter MTT staining. Collectively, these data show the novel finding that bile acids can induce toxicity to prostate cancer cells and suggest that neither sPLA2, iPLA2, nor oxidative stress mediates the mechanisms of cytotoxicity.

Abstracts

Comparison of Two Biocatalysts for Ethanol Production from Pectin-rich Biomass with Varying Levels of Industrial Processing

Travis Williams, Jr.
Dr. Joy Doran Peterson, Microbiology, Franklin College of Arts & Sciences

Pectin-rich biomass is an overlooked alternative energy source in the USA. Pectin-rich biomass includes spoiled or rotten fruits, like cull peaches, and waste products from juice and sugar production, like citrus waste (CW) and sugar beet pulp (SBP). This set of experiments examined how varying levels of industrial processing influenced the carbohydrate composition and ethanol production of pectin-rich biomass through the use of two biocatalysts. The biocatalysts used were the yeast, *Saccharomyces cerevisiae* XR122N and the engineered bacterium, *Escherichia coli* LY40A. First, the composition of each biomass was analyzed. The biomass with the least amount of industrial processing, cull peaches, contained a higher concentration of monomeric sugars. The biomass with the most industrial processing, SBP, contained the least amount of free sugars and the intermediately processed CW fell somewhere in between. The amount of available monomeric sugars decreased and the concentration of polymeric biomass increased significantly as the amount of industrial processing of the biomass increased. Next, fermentations with *S. cerevisiae* XR122N were compared to fermentations with *E. coli* LY40A. The industrially processed biomasses, SBP and CW, were best fermented by *E. coli* LY40A. The unprocessed peach biomass was best fermented by *S. cerevisiae* XR122N. Finally, the optimal enzyme loading for fermentation of cull peaches was studied using 15% w/v peach pomace and varying amounts of commercial enzymes. The lowest enzyme loading which still produced the maximum amount of ethanol was 1.88 FPU of cellulase/g dw, 7.50 PGU of pectinase/g dw, and 6.25 CBU of cellobiase/g dw.

The Role of Technology in Early North American Pacific Colonialism

William Willoughby IV
Dr. Claudio Saunt, History, Franklin College of Arts & Sciences

This paper asks one central question: What was the role of technology in early colonialism on the West Coast? Within this context, a series of secondary questions arise: Was it particularly influential? Did it provide a significant advantage to imperialists in conquering new territory? Research methods focused on independent reading, with an emphasis on primary source documents. A common presumption in the historiography of imperialism is that sophisticated European technologies were superior to native technologies, and that this superiority ensured domination. However, in the case of the eighteenth century in the North American Pacific, this reasoning is problematic for two reasons. First, the conflation of sophistication and superiority is presumptuous and often incorrect. Second, given the remoteness of this region, Europeans often found themselves limited not necessarily by technological capacity but by what was available or affordable. The limited availability of European goods increased the importance and use of native technologies, which were adapted to the local environment and made use of locally available materials. Consequently, Europeans relied on native technologies despite preference for their own. In some cases they discovered native technologies to be more useful. In short, European technologies were far less important than we have understood.

Abstracts

Stories of Roswell, Georgia: A Sociolinguistic Study of Narrative Structure

Anna Wilson, CURO Summer Fellow, CURO Graduation Distinction
Dr. Bill Kretzschmar, English, Franklin College of Arts & Sciences

Labov & Waletzky in 1967 established a framework for understanding spoken narrative from a sociolinguistics perspective, which breaks down a story into seven different parts according to function: abstract, orientation, evaluation, temporal juncture, complicating action, resolution, and coda. They established that these structures are employed predictably in spoken narrative, and appear in the above order. In 2010, Hettel & Bounds combined this methodology with corpus linguistics and complexity theory for fresh insights into how speakers tell stories. They found Labov & Waletzky's proposed sequence of structures was preserved as a generalization across speakers, but was highly variable at the individual level. In my own research, I have used Hettel & Bounds' methodology to further investigate the variable nature of narrative structure in English, as well as to address Spanish. Since fall 2011, I have been researching with the Roswell Voices Project, a civic-academic partnership between the Convention & Visitors Bureau of Roswell, Georgia, a northern edge city of Atlanta, and the University of Georgia. Its purpose is to describe the Roswell community culturally and linguistically. As a part of this objective, I have endeavored to extend the scope of the Project to encompass Roswell's Latino community, which now comprises a quarter of the city's overall population of 100,000. I interviewed 26 Latino community members, from which I selected a sampling plan of eight to transcribe and annotate for narrative structure. Each phrase of each speaker's narrative, subdivided by word, is labeled as fulfilling one of the narrative functions delineated by Labov & Waletzky (1967). Results indicate that narrative structure is more variable than originally supposed, and that the paradigm functions differently in Spanish than in English.

Serum Free Cortisol Fraction and Insulin Concentration in Normal Horses, Obese Horses and Horses with Pituitary Pars Intermedia Dysfunction

Devon Wochele
Dr. Kelsey Hart, Large Animal Medicine, College of Veterinary Medicine

Cortisol has been theorized to play a role in the development of endocrinopathic laminitis and insulin resistance, important complications of Pituitary Pars Intermedia Dysfunction (PPID) in horses. Measurement of total serum cortisol concentration, which is not typically increased in affected horses, quantifies both protein-bound and free cortisol, though only free cortisol is biologically active. The objectives of this study were to compare free cortisol fraction (FCF) between horses with PPID and age-, sex- and season-matched healthy horses, and to determine if FCF and hyperinsulinemia are correlated in PPID and obese horses. Body condition scores (BCS) were determined and blood was collected in October, January, April, and July from 57 healthy adult horses. Archived frozen serum samples were obtained from 20 horses diagnosed with PPID and from 19 obese horses. Serum insulin and total cortisol concentrations and FCF were measured with previously validated radioimmunoassay, chemiluminescent immunoassay, and ultrafiltration/ligand-binding assay respectively. In healthy horses, there was a significant association of increasing BCS with increasing insulin concentration and increasing FCF ($P < 0.0001$). Total cortisol concentration was not significantly different between PPID and healthy horses, but both insulin concentration and FCF were significantly higher ($P=0.011$ and $P=0.0004$) in PPID horses than healthy horses. In obese horses, FCF was significantly

higher in hyperinsulinemic horses than normoinsulinemic horses (P = 0.037); there was no difference in PPID horses (P = 0.6341). These data suggest that cortisol binding dynamics may be altered in horses with obesity and PPID, resulting in increased free cortisol.

Clarification of the Mechanism of *Aliivibrio fischeri* HutW, a class C Radical SAM Methyltransferase Enzyme

Addison Wright, Foundation Fellow
Dr. William Lanzilotta, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Aliivibrio fischeri is capable of utilizing external heme as an iron source. In iron-limiting conditions, the bacterium expresses a heme utilization (hut) operon that codes for three proteins, HutW, HutX, and HutZ, homologs of which are necessary for the growth of *Vibrio cholerae* with heme as the sole iron source. The precise roles of these proteins in heme utilization in *A. fischeri* are unclear. HutW contains a core domain characteristic of radical SAM enzymes, with a specialized [4Fe-4S] cluster coordinated by three cysteine residues in a conserved CxxxCxxC motif, as well as a distinct C-terminal domain. Recent work suggests that HutW is a member of the Class C radical SAM methyltransferase (RSMT) family, a group of enzymes with an unknown mechanism. RSMTs are involved in a range of reactions that utilize SAM as the source of a radical, generated by reductive cleavage of S-adenosyl methionine, and either another SAM molecule or methylcobalamin as a methyl donor. Class A RSMTs use two SAM molecules and proceed via a methylthioether intermediate, while class B enzymes are cobalamin-dependent. HutW has methyltransferase activity in the presence of SAM, heme, and a reductant. This study proposes to clarify the mechanism of HutW through site-directed mutagenesis. Substitutions of the cluster-coordinating cysteines will confirm the importance of the cluster while substitutions of other cysteines will clarify whether the reaction proceeds by a class A-like mechanism. A greater understanding of HutW's mechanism could reveal a novel methyltransferase reaction and potentially allow for the development of enteric pathogen-specific drugs.

The Effect of Thiamine Supplementation on Transketolase Activity in Cancer Cells

Star Ye, CURO Summer Fellow, CURO Graduation Distinction
Dr. Jason Zastre, Pharmaceutical & Biomedical Sciences, College of Pharmacy

The increased glucose uptake observed in cancer cells parallels rapid tumor growth. Cancer cells preferentially undergo fermentative glycolysis in the presence of oxygen, a phenomenon termed the Warburg effect. Alterations in the activity and regulation of glycolytic enzymes cause the accumulation of intermediate metabolites, such as fructose-6-phosphate (F6P) and glyceraldehyde-3-phosphate (G3P). Excess F6P and G3P are shunted into the non-oxidative pentose phosphate pathway (PPP) for the production of nucleic acids essential to cancer cell proliferation. Non-oxidative PPP substrate flux is regulated by transketolase (TKT), a thiamine-dependent enzyme. Compared to normal cells, cancer cells are more dependent on the non-oxidative PPP. Previous studies have shown that the non-oxidative PPP provides at least 85% of nucleic acids for malignant cells. Because transketolase is a thiamine-dependent enzyme, we hypothesize that thiamine regulates glucose consumption, non-oxidative PPP substrate flux, and transketolase expression in cancer cells. Results from glucose assays demonstrate that thiamine supplementation stimulates glucose utilization. Preliminary radioactive glucose labeling experiments reveal that thiamine increases non-oxidative PPP substrate flux. Evidently, thiamine supplementation enhances transketolase

activity, which may promote cancer cell growth and proliferation.

Relationship between Number of Years in Animal Health Practice and Recognizing Pain

Courtni Young, CURO Honors Scholar
Dr. Erik Hofmeister, Small Animal Medicine & Surgery, College of Veterinary Medicine

The gold standard for diagnosing pain in people is by self-report. Unfortunately for veterinarians, their patients are incapable of communicating with them. Several scales have been constructed to help aid veterinarians in their analysis of determining the level of pain their patients are in. The hypothesis of this study was that sophomore veterinary students would be more able to detect painful patients than freshmen veterinary students. Volunteer first and second-year undergraduates at the University of Georgia were shown short clips of dogs recovering from surgery and asked to rate how much pain, if any, the dogs were in. After collecting the data, the agreement between participants was tested using the Fleiss-Kappa and the Bland-Altman plot. Results from our data show there is low agreeability among the participants. The highest agreement score between freshmen was 0.113939 while the highest agreement score among sophomores was 0.078086. Volunteers owning several pets prior to the research also showed little agreeability, as did those volunteers who owned at most one pet. There was also little agreeability between the Visual Analogue Scale and the Numerical Rating Scale, with the average correlation between the two scales being 0.2594. Agreeability between the Numerical Rating Scale and the Glasgow Scale was very low, with the average correlation between the two scales being 0.0494. Based on these findings, we can conclude that there is little, if any, reliability of the VAS, the NRS, and the Glasgow scales between each other and little agreeability between the different undergraduate levels.

Mikhail Bulgakov's Mysteries: The Personas, Metaphors, and Names of the Novel *The Master and Margarita* Analyzed in a Historical Context

Alisa Zezetko
Dr. Elena Krasnostchekova, Germanic & Slavic Studies, Franklin College of Arts & Sciences

Brilliant Russian writer Mikhail Afanasyevich Bulgakov started writing *The Master and Margarita*, his greatest masterpiece, in 1928 and continued revising it until 1940, the year of his death. *The Master and Margarita* intertwines three stories: one about Pontius Pilate and Yeshua in Jerusalem, one about the chaos and disorder that ensues when the devil Voland and his entourage visit atheistic Moscow, and one about the romance between Master and Margarita. This paper analyzes the two revolutions in Bulgakov's novel: the revolution struggling to create the Christian faith in Jerusalem and the revolution striving to destroy that same faith in 1930s Soviet Russia. Bulgakov skillfully interweaves his anti-Soviet ideas under metaphors revealing the degraded sociopolitical morale and insanity behind the facade of a nation. Simultaneously, he deepens the complexity and interrelatedness of the plot by choosing suggestive personas and names. This research provides some new perspectives about the meaning of Bulgakov's chosen personas, metaphors, and names and explores the fears and daily tragedies of Soviet life. These interpretations come from the scrutiny of *The Master and Margarita*, Bulgakov's life, and the culture of the Soviet Union.

Understanding Ecological Networks: A Mathematical Approach to Ecosystem Balancing and Analysis

Brent Zurcher
Dr. Caner Kazanci, Mathematics, Franklin College of Arts & Sciences

New methods of mathematical network analysis have brought vast new potential to

the exploration of ecosystems. In order to perform such analysis, however, data collected by ecologists from the field must be converted into a useful mathematical form. The purpose of this study was twofold: to explore the mathematical definition of "distance" between two ecological networks and to develop a minimal-change balancing method that would account for error in field-collected data. Based on the flux decomposition of a network, the distance metric was defined to be the magnitude of a vector between two flux coefficient vectors representing two unique steady states of the same network. Based on application of this distance metric to several steady states across three different networks, the study showed that this distance metric exhibits unique geometry determined by network structure, potentially leading to further understanding of ecosystem dynamics. The network balancing method is based on the desire to generate a steady-state network from field-collected data that suggest an impossible unsteady-state network. Utilizing the stoichiometric matrix of the network and a flow value vector quantifying the network, it was shown that a constrained minimization problem yields a steady-state network with the minimal possible change to the collected data. Based on testing in MATLAB using three different networks, the amount of change required to achieve a steady state is less than any other known existing method. This new method shows promise as a data correction agent for all ecologists to more effectively analyze their ecosystem of interest.

Index of Presenters and Faculty Mentors

Index of Presenters and Faculty Mentors

Index of Presenters and Faculty Mentors

Index of Presenters and Faculty Mentors

W

Y

Z

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CURO

2014
CURO SYMPOSIUM
PROGRAM & ABSTRACTS

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2014

CURO

Symposium

Program and Abstracts

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Table of Contents

CURO

March 31, 2014

Dear Students, Faculty, and Guests,

Welcome to the 14th annual CURO Symposium, UGA's celebration of undergraduate research across the disciplines. Many individuals—administrators, faculty members, staff, graduate students, and, of course, undergraduate students—have collaborated to make the CURO Symposium the premier undergraduate academic event at UGA.

Each year, the Symposium has grown larger, and the 2014 Symposium is the largest to date, with 258 undergraduate researchers communicating their substantial accomplishments to their peers, mentors, and the public at large.

From its inception, the CURO Symposium has showcased research and scholarship in all disciplines. The 2014 Symposium continues that commitment, featuring presenters from 50 departments in 13 colleges/schools. Thus, this two-day event displays UGA's broad and substantial support of research and the invaluable commitment of UGA's administration and faculty to mentoring and providing exceptional learning opportunities for our undergraduates.

Thank you for your continued support of undergraduate research and CURO.

Sincerely,

Dr. David S. Williams, '79, '82
Associate Provost and Director

Dr. Martin P. Rogers, '01, '11
Associate Director

Acknowledgements

Special Assistance for 2014 CURO Symposium

Ms. Jami Gilstrap	Administrative Associate, CURO
Mr. Steven Honea	Academic Advisor, Honors Program
Ms. Dorothé Otemann	Coordinator of External Affairs, Honors Program
Ms. Amanda Pruitt	Assistant to the Director, Honors Program
Ms. Chelsea Smith	Administrative Associate, External Affairs, Honors Program

Technology Equipment and Support for 2014 CURO Symposium

Center for Teaching & Learning
Franklin College of Arts & Sciences
Honors Program
Odum School of Ecology
Terry College of Business

Reviewers for 2014 CURO Research Mentoring Awards

Dr. Martin Rogers	Associate Director of CURO and Honors
Dr. David S. Williams	Associate Provost and Director of Honors and CURO

Reviewers for 2014 CURO Symposium Best Paper Awards

Mr. Ethan Boldt	Presidential Graduate Fellow, Department of Political Science
Mr. Benjamin Campbell	Presidential Graduate Fellow, College of Education
Dr. Sean Ingham	Department of Political Science
Mr. Douglas Merchant	Presidential Graduate Fellow, Department of Linguistics
Dr. Martin Rogers	Associate Director of CURO and Honors
Mr. Jerrett Warshaw	Presidential Graduate Fellow, Institute of Higher Education

Oral Session Conveners for 2014 CURO Symposium

Ms. Jessica Chappell	Odum School of Ecology
Ms. Laura Fletcher	Presidential Graduate Fellow, Department of Psychology
Ms. Sayonita Ghosh Hajra	Department of Mathematics
Ms. Arlana Henry	Department of Sociology
Ms. Linnea Ionno	Department of Public Administration and Policy
Ms. Michele Johnson	Academic Advisor, Honors Program
Mr. Adrian Klemme	Institute of Higher Education
Mr. Bill McDowell	Odum School of Ecology
Ms. Emily Myers	Administrative Associate, Foundation Fellowship Office, Honors Program
Ms. Kathleen Pieper	Presidential Graduate Fellow, Department of Genetics
Mr. Greg Rountree	Administrative Associate, Office of Recruitment, Honors Program
Ms. Elizabeth Sassler	Department of Public Administration and Policy

Schedule

Monday, March 31, 2014

Oral Session I **1:25-2:15 p.m.**
Athena Breakout Rooms A, B, C, D

Oral Session II **2:30-3:20 p.m.**
Athena Breakout Rooms A, B, C, D,

Awards and Keynote Session **4:00-5:00 p.m.**
Athena Room E

Poster Session and Reception **5:00-6:00 p.m.**
Grand Hall South (downstairs – use escalator in lobby)

Tuesday, April 1, 2014

Oral Session III **9:30-10:45 a.m.**
Athena Breakout Rooms A, B, C, D, G, H, I, J

Oral Session IV **11:00 a.m.-12:15 p.m.**
Athena Breakout Rooms A, B, C, D

Oral Session V **12:30-1:45 p.m.**
Athena Breakout Rooms A, B, C, D, G

Oral Session VI **2:00-3:15 p.m.**
Athena Breakout Rooms A, B, C, D, G, H, I, J

Oral Session VII **3:30-4:45 p.m.**
Athena Breakout Rooms A, B, C, D, G, H, I, J

CURO Research Mentoring Awards

The Office of the Senior Vice President for Academic Affairs and Provost and the Honors Program established the CURO Research Mentoring Awards, formerly the EURM awards, in 2001.

These awards recognize outstanding faculty who consistently engage undergraduate researchers through CURO Programming (courses, the symposium, summer fellows, JURO, theses, et al.) and enhance the learning experience of undergraduate researchers at the University of Georgia. Award recipients have provided superior research opportunities and mentoring and have collaborated with undergraduate researchers on publications and presentations at professional conferences.

Before 2014, awards were designated as "Early Career" and "Master Level" and were granted to corresponding faculty ranks.

2014

Dr. Carl Bergmann, Associate Vice President for Research-Facilities; Associate Director, Complex Carbohydrate Research Center; Executive Director, Animal Health Research Center; Senior Research Scientist

Dr. Andrew Owsiak, Department of International Affairs, School of Public & International Affairs

2013

Master Level Faculty Award
Dr. Jennifer McDowell, Department of Psychology, Franklin College of Arts & Sciences

Early Career Faculty Award
Dr. Katalin Medvedev, Department of Textiles, Merchandising & Interiors, College of Family & Consumer Sciences

2012

Master Level Faculty Award
Dr. Lawrence Shimkets, Department of Microbiology, Franklin College of Arts & Sciences

Early Career Faculty Award
Dr. Michael Yabsley, Warnell School of Forestry & Natural Resources

2011

Master Level Faculty Award
Dr. Eric Stabb, Department of Microbiology

Early Career Faculty Award
Dr. John Drake, Odum School of Ecology

Program Award
Savannah River Ecology Laboratory
Dr. Kenneth McLeod, Interim Director

2010

Early Career Faculty Award
Dr. John C. Maerz, Warnell School of Forestry & Natural Resources

CURO Research Mentoring Awards

2009

Early Career Faculty Award
Dr. Brian S. Cummings, Department of Pharmaceutical & Biomedical Sciences
Dr. Anna C. Karls, Department of Microbiology
Dr. Dawn T. Robinson, Department of Sociology

2008

Master Level Faculty Award
Dr. John J. Maurer, College of Veterinary Medicine

Early Career Faculty Award
Dr. Walter K. Schmidt, Department of Biochemistry & Molecular Biology

Program Award
Biomedical and Health Sciences Institute
Dr. Harry S. Dailey, Director

2007

Master Level Faculty Award
Dr. Timothy Hoover, Department of Microbiology
Early Career Faculty Award
Dr. Steven Stice, Department of Animal & Dairy Science

2006

Master Level Faculty Award
Dr. Patricia Hunt-Hurst, Department of Textiles, Merchandising & Interiors
Early Career Faculty Award
Dr. Rodney Mauricio, Department of Genetics
Graduate Student Award
Christopher Anderson, PhD candidate in Ecology
Graduate Student Recognition
Dawn Holligan, PhD candidate in Plant Biology

2005

Faculty Award
Dr. Gary Barrett, Odum School of Ecology
Dr. Sidney Kushner, Department of Genetics
Department Award
Department of Cellular Biology

2004

Faculty Award
Dr. William S. Kisaalita, Department of Biological & Agricultural Engineering

CURO Research Mentoring Awards

2003

Faculty Award

Dr. Jody Clay-Warner, Department of Sociology

Department Award

Department of Microbiology
Dr. Duncan Krause, Department Head
Dr. Timothy Hoover, Undergraduate Coordinator

Program Award

The Pratt Laboratory of Plant Genomics and Bioinformatics
Dr. Lee H. Pratt, Department of Plant Biology
Dr. Marie-Michèle Cordonnier-Pratt, Department of Plant Biology

2002

Faculty Award

Professor William D. Paul, Jr., Lamar Dodd School of Art
Dr. Katherine Kipp, Department of Psychology

Faculty Recognition

Dr. Susan Sanchez, College of Veterinary Medicine

Department Award

Department of Biochemistry & Molecular Biology
Dr. J. David Puett, Department Head

Program Award

"Physics Beyond the Boundaries": National Science Foundation, REU Program
Dr. Loris Magnani, Principal Investigator, Department of Physics & Astronomy
Dr. Heinz-Bernd Schuttler, Department Head, Department of Physics & Astronomy
Dr. Jonathan Arnold, Department of Genetics
Dr. Susmita Datta, Georgia State University
Dr. David Logan, Clark Atlanta University
Dr. William Steffans, Clark Atlanta University

2001

Faculty Award

Dr. Marcus Fechheimer, Department of Cellular Biology

Faculty Recognition

Dr. David MacIntosh, Department of Environmental Health Sciences
Dr. Dean Rojek, Department of Sociology

Department Award

Department of Genetics
Dr. John MacDonald, Department Head

Program Award

Savannah River Ecology Laboratory
Dr. Paul Bertsch, Director

CURO Symposium Best Paper Awards

Since 2001, CURO Symposium Best Paper Awards have recognized excellence in papers developed from work being presented at that year's Symposium.

Applicants may submit in one or more of the following categories: Arts, Humanities and Media; Business; Life Sciences; Physical and Environmental Sciences; Public and International Affairs; Social Sciences; and Technology, Engineering and Math.

Each recipient is recognized at the Symposium's Award and Keynote Session, and each award carries $100 in financial support, generously provided by the UGA Alumni Association. Winners from the 2014 CURO Symposium are listed below.

Arts, Humanities and Media:

Greyson Clark	Power Dynamics in Georgia's Poultry Industry, 1950-1965

Life Sciences:

Katherine Hsieh	The Effect of a Patellar Tendon Strap on Knee Power during a Drop-Jump

Physical and Environmental Sciences:

Carmen Kraus	Density Dependent Regulation of Survival and Reproduction in Dogbane Beetles and Underlying Host-Plant Interactions

Public and International Affairs:

Anne Chen	Sex-Ratio Imbalances and Risky Behavior in College

Social Sciences:

Lindsay DeFrancesco	Students' Perceptions of the Police – An Analysis of Greek and Non-Greek Affiliated Students

Program: Monday, March, 31, 2014

Oral Session I: 1:25-2:15 p.m.
Athena Breakout Rooms A, B, C, D

Room A	**Julia Carpenter**	A Storyworld with Incalculable Authors: Defining, Finding and Committing Narrative in the World of Social Media
	Connor Hamm	The Digital Future – Investing and Investigating
	Noah Boswell	Marketing an Online Based Education Platform
Room B	**Stephanie Wilding**	The Expression of the Bile Acid Receptor TGR5 in Prostate Cancer Cells and its Role in Bile Acid-Induced Cell Death
	Anjali Kumar	Glycoproteomic Approaches for Pancreatic Cancer Biomarker Discovery
	Taylor Chishom	Polyadenylation in Stationary Phase *Escherichia coli:* Analysis of the Role of RNA Polymerase
Room C	**Carmen Kraus**	Density Dependent Regulation of Survival and Reproduction in Dogbane Beetles and Underlying Host-Plant Interactions
	Lara Mengak	Why is There an Alligator in My Pool? Assessing Potential Range Shifts with Sea Level Rise
	Chelsea Sexton	Parasite Selective-Pressure Alters Reproductive Strategy in *Littorina saxatilis*, an Intertidal Snail
Room D	**Leslie Stapley**	The Influence of Neuroticism, Openness, and Conscientiousness on Executive Functioning in Older Adults
	Kirstie Chu	Predicting Functional Independence with Impulsivity
	Savannah Boyd	What Predicts Willingness to Support a Partner's Smoking Cessation Attempt?

Oral Session II: 2:30-3:20 p.m.
Athena Breakout Rooms A, B, C, D

Room A	**Brian Underwood**	Against All Reason: Rousseau and the Counter-Enlightenment
	Ryan Slauer	The Lines are Drawn: Christian Apologies in Late Antiquity
	Joseph Hopkins	Norse Mythology in Modern Popular Culture: Sixty Interviews Conducted in Athens, Georgia and Copenhagen, Denmark during the Summer of 2013

Program: Monday, March, 31, 2014

Room B	**Lucas Wachsmuth**	Ectopic Endodermal Expression of Foxn1 in a Murine Model
	Francine Katz	The Role of tRNA Nucleotidyl Transferase in tRNA Processing in *Escherichia coli*
	Aparna Philip	Transferrin-Crosslinked Liposomes for Targeted Drug Delivery to *Trypanosoma brucei*
Room C	**Minhnguyen Cao**	Parenting Stress, Emotion Dysregulation, and Emotion Coaching as Predictors of Child Behavior Problems in the Context of SES and Race
	Charlotte Goldman, Amy Davis, Kelsie Flanigan	Parent and Child Perceptions of Health-Related Quality of Life and Psychological Functioning in Children with Tourette Syndrome
	Hania Bisat	Embodiment and Altruism
Room D	**Patrick Wheat**	The Justification for Ethnic War
	Anne Pellegrino, Jonah Driggers, Elijah Scott, Meili Swanson, Luke Thompson, Patrick Wheat	New Aid for Africa
	Melanie Kent	Nationalism vs. Global Jihad: Al-Qaeda and Precursors in Algeria, Somalia and Yemen

Awards and Keynote Session: 4:00-5:00 p.m.
Athena Room E

Welcome and Introductions	Dr. David S. Williams, Associate Provost and Director of Honors and CURO
Remarks	UGA President Jere W. Morehead
Introduction to Awards	Dr. Martin Rogers, Associate Director of CURO and Honors
CURO Research Mentoring Awards	Dr. David C. Lee, Vice President for Research
2014 Symposium Best Paper Awards	Dr. Laura Jolly, Vice President for Instruction

Program: Monday, March, 31, 2014

UGA Libraries' Research Awards	Ms. Elizabeth White, Librarian, UGA Libraries
Introduction of Keynote Speaker	Ms. Smitha Ganeshan, Foundation Fellow '14, Biology
Keynote Address	Dr. Phaedra Corso, Professor of Health Policy and Management, "Health Policy and the Promise of Research"
Closing Comments	Dr. David S. Williams, Associate Provost and Director of Honors and CURO

Poster Session: 5:00-6:00pm
Sponsored by the Office of the President
Grand Hall South (downstairs – use the escalator in the lobby)

Poster #1	**Justin Dumrongkulraksa**	Bridging the Gap: The History of British Science Examined through Literature
Poster #2	**Moriah Jackson**	*Mycoplasma gallisepticum* Infection and Shed in Commercial and Wild Turkeys
Poster #3	**Rachel Jude**	The Pathogenicity of *Mycoplasma gallopavonis* in Wild and Commercial Turkeys
Poster #4	**George Grant**	Impacts of Organic Soil Amendments on Micro-Nutrient and Carbon Sequestration under Natural Rainfall Conditions, 2010-2013
Poster #5	**Keelan Lawrence**	Wavefront Sensorless Adaptive Optics with Differential Interference Contrast Microscopy
Poster #6	**Billie Hardigree**	Viscosity-Dependent Behavior of Cyclopenta[b]naphthalene Fluorophores
Poster #7	**Victoria DeLeo**	Intron Loss in the ABCB1 Gene
Poster #8	**Rachel Rotz**	An Integrated Approach for Verification of Rapid Focused Recharge Zones in the Arabian Peninsula Using Thermal and VNIR Remote Sensing
Poster #9	**Adam Jones**	Stable Isotope and Crystallinity Variations in Kaolin Deposits of Georgia in Up Dip to Down Dip Occurrences
Poster #10	**Philippe Bauchau**	Clinoptilolite Formation in the Lower Floridan Aquifer
Poster #11	**Hayden Field**	Hemlock Embryo Rescue Project

Poster #12	**Carmen Kraus**	Density Dependent Regulation of Survival and Reproduction in Dogbane Beetles and Underlying Host-Plant Interactions
Poster #13	**Kyungmin Ko**	The Trade-Off between Mating and Fighting in *Nicrophorus vespilloides*
Poster #14	**Lara Mengak**	Why is There an Alligator in My Pool? Assessing Potential Range Shifts with Sea Level Rise
Poster #15	**Timothy Montgomery**	Balancing Carbon and Phosphorus for Consumers: Does Nutrient Enrichment Tip the Scale?
Poster #16	**Blake Edwards**	Enzymatic Assay of DHPS Degradation in Abundant Marine Alphaproteobacteria
Poster #17	**Jasmin Melara**	Carbon Flux in the Amundsen Sea Polynya
Poster #18	**Dylan Goetz**	Data Analysis of Seawater Samples Collected Off the Coast of Barrow, Alaska
Poster #19	**Shannon Burns**	Riverwater and Seawater Dissolved Inorganic Carbon Endmembers for the Amazon River Plume
Poster #20	**Laurence Black**	Response of Microbial Nitrification and Denitrification to Redox Shifts in Beach Sand
Poster #21	**Amala Malladi**	Development of an In-Frame Deletion System for *Ruegeria pomeroyi*
Poster #22	**Laura Alexander**	Identification of a Novel O-Antigen and its Role in the Virulence of *Aeromonas hydrophila* Isolated from Diseased Catfish
Poster #23	**Anquilla Deleveaux**	Determining the Role of FhlA in Transcriptional Activation of Newly Identified RpoN Dependent Promoters
Poster #24	**Cameron Story**	Characterization of the *rsr-rtcBA* operon in *Salmonella typhimurium*
Poster #25	**Leah Williams**	Sigma-54 Promoter Activity and Gene Regulation in *Salmonella*
Poster #26	**Alison McWhorter Anderson**	Examination of the Pathogenic Nature of *Mycoplasma pneumoniae*

Poster #27	**Babajide Oluwadare**	Analysis of P1 Function in *Mycoplasma pneumoniae* Adherence and Gliding
Poster #28	**Chetan Hebbale**	A Targeted and an Unbiased Screen for Genetic Suppressors of the *Legionella pneumophila* Effector Protein LegC7
Poster #29	**Jacob Kumro**	Mapping of the oriT Region of the Virulence Plasmid of *Rhodococcus equi*
Poster #30	**Breanna Crowell**	The Evolution and Tradeoffs of Physical and Chemical Leaf Defenses in *Helianthus*
Poster #31	**Chinyere Uzoigwe**	Nitrogen Resorption in *Helianthus* Species
Poster #32	**Kaleigh Davis**	Evolution of Flowering Time and Disc Color across the Genus *Helianthus*
Poster #33	**Vanessa Gutierrez**	Investigating the Role of HAN Transcription Factors during Plant Development
Poster #34	**Janefrances Egbosiuba**	The Preliminary Investigation of Whether Switchgrass SND1 Orthologs Can Activate the Secondary Wall Biosynthesis
Poster #35	**Austin Garner**	The Genetics of Early Hybrid Lethality between Two Species of *Mimulus*
Poster #36	**Shreya Patel**	Role of Salicylic Acid in Oxidative Stress Responses in *Arabidopsis thaliana*
Poster #37	**Ishwarya Soundappan**	Genetic Analysis of the Role of *SMAX7* in Regulating Shoot Architecture
Poster #38	**Nikhil Kamath**	Identifying Interacting Proteins in the Karrikin and Strigolactone Signaling System
Poster #39	**John Brunson**	Sphingolipid Metabolism and the Biological Clock in *Neurospora crassa*
Poster #40	**Sarah Cunningham**	Modeling the Biological Clock in *Neurospora crassa*
Poster #41	**Solomon Walker**	The Effect of the Protein Ras2 on the Biological Clock of the Fungus *Neurospora crassa*
Poster #42	**Akshey Walia**	Cell Cycle Regulation of BMP Signal Transduction

Poster #43	**Philip Grayeski**	Cell Cycle Gating of the Mammalian Sonic Hedgehog Signaling Pathway
Poster #44	**Amy Webster**	Breaking Mendel's Laws: How Abnormal Chromosome 10 Causes Meiotic Drive
Poster #45	**Brianna Stadsvold**	The Effect of Telomere Dysfunction on Non-Allelic Recombination in the Subtelomere of *Kluyveromyces lactis*
Poster #46	**Briana Bennett**	Differential Expression of Genes Involved in the Insulin Growth Factor Pathway in Breast Cancer
Poster #47	**DeJuana Ford**	Healthcare, Genetics, Society and the Black-White Breast Cancer Survival Disparity
Poster #48	**Krupa Merchant**	Clicking on Platinum: Copper(I)-Catalyzed Azide-Alkyne Cycloaddition Chemistry for Axial Functionalization of Pt(IV) Prodrugs
Poster #49	**Trenton Berding**	The Creation of an Anticancer Prodrug – Combining Aspirin with Cisplatin
Poster #50	**Laura McLean**	Effect of Metformin Treatment on Feline Sarcoma Cancer Cell Cycle and Apoptosis
Poster #51	**Sheela Sheth**	Characterization of Proteoglycans in Prostate Cancer Cell Growth
Poster #52	**Christopher Watkins**	Mimicking the EGFR Dimerization Arm Using Triazolyl-Bridged Peptides: An Alternative Approach to EGFR Inhibition
Poster #53	**Anish Narayanan**	Analysis of Cancer Mutations in Protein Kinases Using Semantic Web Technologies
Poster #54	**Caitlin Gilbert**	The Role of O-Linked β-N-Acetylglucosamine in the Epigenetic Regulation of Colon Cancer Stem Cells
Poster #55	**Joshua Chang**	Proteomic Identification and Analysis of Potential Biomarkers for Pancreatic Adenocarcinoma
Poster #56	**Sindhu Prabakaran**	Investigating Missense Mutations in O-GlcNAc Transferase that Lead to Human X-Linked Intellectual Disability
Poster #57	**Niraj Patel**	Recombinant Protein Therapy: Generation and Purification of Various Fukutins

Poster #58	**Jill Modi**	Fiber Isotype Post-Injury in Secondary Dystroglycanopathies
Poster #59	**Vedika Rajasekaran**	Validating *In Vitro* Cell Culture Models for Molecular Pathogenesis Studies in *Fktn*-deficient Muscular Dystrophy
Poster #60	**Karishma Sriram**	Bone Fracture Putty: A Combined Stem Cell and Lentiviral Approach
Poster #61	**Joshika Money**	VacSIM, a New Vaccine Delivery Method, Improves Cellular Recruitment to Local Draining Lymph Nodes
Poster #62	**Matthew Winn**	Interactions between Neutrophils and *Pseudomonas aeruginosa* Flagellum
Poster #63	**Chelsea Fitzhugh**	Examination of the Function of *cobU* in Vitamin B12 Synthesis in Mycobacteria
Poster #64	**Mathew Joseph**	Immunopathogenesis of Placental Malaria in Mice Lacking Tumor Necrosis Factor and its Receptors
Poster #65	**Omar Martinez-Uribe**	Signaling Through TNF Receptors during Placental Malaria
Poster #66	**Tiffany Jenkinson**	Investigating the Relationship between the Complement and Coagulation Cascades in Placental Malaria
Poster #67	**Kristen Bascombe**	Light-Dependent Protein Degradation in *Plasmodium falciparum*
Poster #68	**Nina Paletta**	Use of Synthetic AKAP Peptides to Assess the Importance of the Protein Kinase A Signaling in the African Trypanosome
Poster #69	**Zachary Whitt**	The Utilization of Genetic Manipulation to Better Understand Kinative Function of CK1.2 in *Trypanosoma brucei*
Poster #70	**Melissa Jennings**	Biosynthesis of Base J by JBP1 and JBP2
Poster #71	**Allison Becker**	Plasmonemes: A Novel Cell-Cell Interacting Structure in *Trypanosoma brucei*
Poster #72	**Hayes Patrick**	The Double Knockout of the Haptoglobin-Hemoglobin Receptor in Bloodstream-Form *Trypanasoma brucei brucei* Lister 427-Single Marker Clone

Poster #73	**Lauren Dennison**	Mechanism of Mammalian Resistance to Trypanosome Lytic Factor
Poster #74	**Christopher Witt**	TLF2 Synthesis from Oxidized Lipids in TLF1
Poster #75	**Michael Cheng**	*Saccharomyces cerevisiae* as a Model System of Aβ Peptides Using a Copper Resistance Reporter
Poster #76	**William Saunders**	Investigations of a Protease (Ste24p) Associated with Progeroid Disease
Poster #77	**Elijah Mehlferber**	Effect of Differing Larval Diet on Adult Fitness Measured through Body Size, and Novel Methods for Body Size Quantification in *Drosophila suzukii*
Poster #78	**Melissa Masserant**	The Role of Dopamine in the Perception of Olfactory Inputs in Drosophila Larvae
Poster #79	**Caroline Blatcher**	*Pax6* Expression in the Adult Sey and Wildtype Brain
Poster #80	**Ojaswa Prasad, Dennis Dwan**	A Yeast-Based Screen for Drugs That Can Inhibit Human *Cdc6*
Poster #81	**Elizabeth Guarisco**	Examination of the Link between Glycosaminoglycans and Pectins
Poster #82	**Jerin Varghese**	A Proteomic Study of the *Botrytis cinerea*-Tomato Interaction
Poster #83	**Lucas Wachsmuth**	Mutations Impacting Copy Number Control and Host Cofactor Involvement in Retrotransposition of Ty1
Poster #84	**Stanislav Bushik**	Purification and Characterization of APAP1-Like Proteoglycans from Rice Suspension Culture Media
Poster #85	**Swayamdipto Misra**	Generation of Transgenic Plants Carrying Promoter: Reporter-Gene Constructs to Investigate Transcriptional Expression of GAUT Genes in Arabidopsis
Poster #86	**Lisa Ishii**	Molecular and Functional Characterization of FUCOSYLTRANSFERASE 10 in *Arabidopsis thaliana*
Poster #87	**Korry Tauber**	Examining the Function of O-GlcNAc in Regulating Inter- and Intracellular Signaling Pathways during Drosophila Development

Poster #88	**Leah Caplan**	Pigmentation and Protein Glycosylation in the Drosophila Embryo
Poster #89	**Ramon Reddick**	Purification of Xyloglucan-Specific Endo-β-1, 4 - Glucanase after Expression in *Escherichia coli*
Poster #90	**Sarah Premji**	Suboptimal Time in Therapeutic Range (TTR) for International Normalized Ratio (INR) Measurements Observed in an Outpatient Cardiology Clinic: Impact of Gender, Ethnicity, Disease Etiology, CHADSVasc score, Physicians and Clinic Site
Poster #91	**Mary Elizabeth Nuttall**	Economic Transition and Psychological Distress as it Relates to Risk Factors for Cardiovascular Disease in St. Lucia
Poster #92	**Christina Nguyen**	Work-Sites with Physical Exercise Facilities and Their Effect on Employee BMI and Waist Circumference
Poster #93	**Natalie Taylor**	Differences in Children's Physical Fitness by Rural or Urban Location
Poster #94	**Tracy Phan**	Football Facemask Mass Influences Head Impact Location
Poster #95	**Brice Hsu**	Mitochondrial Up-Regulation after Moderate Exercise in Able-Bodied Individuals with Near-Infrared Spectroscopy
Poster #96	**Hannah Bossie, Miller Singleton**	Evaluation of Mitochondria on Persons with Mitochondrial Myopathies Using Near-Infrared Spectroscopy
Poster #97	**Stephanie Tan, Hannah Bossie, John Hann**	Assessing Mitochondrial Function and Fatigue in the Human Gastrocnemius with Near Infrared Spectroscopy (NIRS)
Poster #98	**Hannah Cornelia**	Effect of Drying on Pulp Characteristics
Poster #99	**Meagan Patterson**	Association between Body Composition and Serum Folate Concentrations in Women Of Childbearing Age: Secondary Analysis across Three Studies
Poster #100	**Courtney Alvis**	Effect of Folate on Lipid Accumulation and Proliferation in Human Primary Adipocytes
Poster #101	**Kathleen Norris**	Proteomic Analysis of Erythrocyte Ghosts: The Effects of Zinc Supplementation

Poster #102	**Andrea Lobene**	The Relationships between Zinc and Bone Strength in Healthy Children
Poster #103	**Megan Ernst**	Addressing Inequality in Early Childhood Executive Function Development
Poster #104	**Brett McCardel, Breanna Ernst, Meghana R. Nathan, Victoria Smith**	The Effect of Order and Condition on Assessments of Executive Function
Poster #105	**Allison Fialkowski**	Single-Case Research Designs to Evaluate Social Behavior Development of Children with Autism Spectrum Disorders
Poster #106	**Amy Davis, Kelsie Flanigan**	Social Skills as Protective Factors against Poor Attitudes Towards Having Tourette Syndrome in Children
Poster #107	**Thomas Greco**	Neural White Matter Integrity Differs between Patients with Schizophrenia and Healthy Controls
Poster #108	**Ian Anderson**	Personal Distress and Response to Ambiguous Emotions
Poster #109	**Lauren Head**	Differences between Cohabiting and Non-Cohabiting Couples Who Participated in Premarital Education
Poster #110	**Yuri Kim**	Marital Security, Depression, and Sleep Quality: Assessing Bidirectional Associations with Actor-Partner Interdependence Model
Poster #111	**Courtland Hyatt**	Effects of Music on Male Aggression: Do Lyrics Matter?
Poster #112	**Jake Moskowitz, Amanda Heaton, Joshua Lukemire, Stephanie Villarreal**	Investigation of Hand-Tool Mastery in Tufted Capuchins Using a Multiple-Jointed Tool
Poster #113	**Kristen Smith, Rhianna Baldree**	Nut-Cracking Skill in Wild Capuchin Monkeys
Poster #114	**Natalie Schwob**	Vocal Repertoire of Red and Green Macaws

Poster #115	**Katherine Partrick**	Exploring the Variable Weaning Strategies of Female Rhesus Macaques through Stable Isotope Biochemistry
Poster #116	**Amber Davidson, Seyi Amosu, Brennen Clift, Sam Craig, Kyle Ledesma**	The Effects of Centralization on Performance When Moderated by Diversity
Poster #117	**Aaron Conley**	The Politicization of Soccer and the Effects of the 2014 World Cup on Brazilian Politics
Poster #118	**Alexa DeAntonio**	Perceptions about Global Development
Poster #119	**Jessie Lian, Alex Ballasiotes**	The Emergence of Sustainability as the New Dominant Logic in Business

Oral Session III: 9:30-10:45 a.m.
Athena Breakout Rooms A, B, C, D, G, H, I, J

Room A	**Richard Gardiner**	The Death of the Death Penalty
	Cecilia Moore, Holly Boggs	Analysis of International Media Coverage of Key North Korean Military Events
	James Barrow	Game Theory and Literature
Room B	**Amelia Watson**	Polio Eradication: What's Still Needed?
	Hannah Reiss	Neonatal Mortality in Uttar Pradesh, India and Possible Policy Solutions
	Smitha Ganeshan	Positive Psychology in Teen Mothers
	Max Tarica	Oxidative Stress within the Placenta during Malaria Infection
Room C	**Minh Ngoc Nguyen**	Metaphors of Color: The Linguistics of Internalized Racism
	McKinley Alden	Age and Formality in German Inalienable Possession Constructions
	Jonathan Dickens	Towards a Dynamical Model of Language Processing
	Ashleigh Starnes	The Linguistics of Artistic Language: Poetry, Complexity, and Mass-Market Novels
Room D	**Katherine Partrick**	Exploring the Variable Weaning Strategies of Female Rhesus Macaques through Stable Isotope Biochemistry
	Natalie Schwob	Vocal Repertoire of Red and Green Macaws
	Leigh Anna Young	Swath Size in Boa Vista's Bearded Capuchin Monkeys
	Thomas Johnston	Influence of Maternal Presence, Age, and Sex on Social Learning
Room G	**Anne Fernandes**	The Evolution of the Little Black Dress
	Lindsay Nation	The DIY Phenomenon: Why We "Do It Ourselves"
	Nancy Satola	Lesbian Dress: Recognizing and Being Recognized
	Devon Sprague	Native American Traditional Dress: Drawing the Line between Celebrating a Culture and Making a Mockery of It
Room H	**Hannah Bossie, Miller Singleton**	Evaluation of Mitochondria in Persons with Mitochondrial Myopathies Using Near-Infrared Spectroscopy

	Sudeepti Kuppa	The Dynamics of MglA in *Myxococcus xanthus* Motility Systems
	Kristen Farley	*Salmonella enterica* and *Escherichia coli* Can Exploit Diverse Pathways to Form Vitamin B1 in the Cell
	Megan Chesne	Applying CRISPR-Cas Interference for Genomic Manipulation in *Streptococcus thermophilus*
Room I	**Lindsay DeFrancesco**	Students' Perceptions of the Police – An Analysis of Greek and Non-Greek Affiliated Students
	Mitra Kumareswaran	A Tax-Deferred Trust: Reducing the Financial Burden of Families with Special Needs Children
	Walker Marlatt	A Change in the Winds: How the 'Dawgs Can Be Proud of More than Just Sports
Room J	**Giovanni Righi**	Addressing Droughts and Water Overuse in the Flint River
	Kirstie Hostetter	The Negative Side Effects of Organophosphate Pesticide Usage in Thailand
	Jasmin Melara	Carbon Flux in the Amundsen Sea Polynya

Oral Session IV: 11:00 a.m.-12:15 p.m.
Athena Breakout Rooms A, B, C, D

Room A	**Mallory Cox**	Ta-Tas or Not: The Needs of Female Breast Cancer Survivors Will Not Be Forgotten
	Lisa Ye Suh	Solution to Allworthy: The Magisterial Roles of Henry Fielding and Allworthy in *Tom Jones*
	Justin Dumrongkulraksa	Bridging the Gap: The History of British Science Examined through Literature
Room B	**Piyush Joshi**	Integrating of Human Neural Progenitor Cells into a Developing Chicken Embryo for a Toxicology Model
	Moriah Jackson	*Mycoplasma gallisepticum* Infection and Shed in Commercial and Wild Turkeys
	Julia McElreath	Arkansas Vaccine Virus Transmitted to SPF Chickens from Vaccinated Broilers Does Not Provide Protection from Challenge
	Hannah Reiss	Creating a Chimeric Chicken Resistant to Newcastle's Disease Virus

Room C	**Meili Swanson**	Improving Access to Screening for Post-Traumatic Stress Disorder in Operation Enduring Freedom and Operation Iraqi Freedom Veterans
	Karishma Sriram	Increasing Physical Education in American High Schools
	Christina Nguyen	Work-Sites with Physical Exercise Facilities and their Effect on Employee BMI and Waist Circumference
	Carver Goodhue	Applying International Strategies to Domestic Issues of Micronutrient Deficiency
Room D	**Pete Nkengasong**	Effects of Patellar Tendon Strapping on Lower-Extremity Kinematics
	Tyler Daugherty	On a Lack of Identifying Obstructive Sleep Apnea
	Jonathan Brown	Comparison of Peak Vertical Ground Reaction Forces between Individuals with Patellar Tendinopathy and Asymptomatic Individuals

Oral Session V: 12:30-1:45 p.m.
Athena Breakout Rooms A, B, C, D, G

Room A	**Sara Black**	And Justice for All: Scale, Solidarity, and Integrational Organizing in the Climate and Immigrant Justice Movements in Georgia
	Manisha Banga	A Mythological Chain of Oppression
	Kinsey Pebley	Issues in the Therapy Experience for the LGBT Community and Their Implications
	Tiffany Brown	The Importance of Local Grassroots Organizations in the Reshaping of Afro-Argentine Consciousness
Room B	**Emily Vermillion**	An Investigation of the Metabolic Changes Associated with Feeding a High-Fat/High-Sugar Diet in Swine
	Amanda Seamon	Incidence of Anesthesia-Related Fatality in Birds
	Elizabeth Wilkins	The Role of Notch Signaling in Astrocyte and Oligodendrocyte Derivation
	Kayla Hargrove	Necessity of Universal Pre-Operative Blood Work Testing in Healthy Dogs

Room C	**Shaun Kleber**	Decreasing Summer Learning Loss among Low-Income Students in Athens-Clarke County
	Shalin Jyotishi	The Executive Science Network: Variations between Public and Private Trustee Networks
	Megan Ernst	Addressing Inequality in Early Childhood Executive Function Development
	Paul Kirschenbauer	Closing the Income Gap – Education and Technology in the United States
Room D	**Mary Douthit**	Octopaminergic Gene Expression and Flexible Social Behavior in the Subsocial Burying Beetle *Nicrophorus vespilloides*
	Tuan Nguyen	Mitogen Activated Protein Kinase Flanking C-Terminal Tail: Structure and Function
	Matthew Hess	Nanoparticle-Delivered Therapeutics for African Trypanosomiasis
	Travis Williams	Fermentation of Cull Peaches Using a Pectinase Producing *Saccharomyces cerevisiae* Strain
Room G	**Megan Griffin**	Do Knee Straps Decrease Self-Reported Patellar Tendon Pain after Jump Landings?
	Katherine Hsieh	The Effect of a Patellar Tendon Strap on Knee Power during a Drop-Jump
	Edmund Afful	The Association between High Intensity Athletic Participation and Chronic Ankle Instability

Oral Session VI: 2:00-3:15 p.m.
Athena Breakout Rooms A, B, C, D, G, H, I, J

Room A	**Patrick Wheat**	The Rationality of Peacekeeping
	Cody Knapp	Building a Record: Requesting Roll Call Votes under Changing Institutions
	Mitchell (Trey) Flynn	Modifying Appointments to the FISA Court
	Marco Roca	1970s Czechoslovakia: A Foundation for the Study of International Human Rights Law

Room B	**Amy Webster**	Breaking Mendel's Laws: How Abnormal Chromosome 10 Causes Meiotic Drive
	Jennifer Pallansch	Bioluminescent Color Shifts in North American Fireflies
	Emily Fawcett	Investigating Female Remating Rates in Wild *Drosophila neotestacea* and Their Association with Sex-Ratio Drive
	Philip Grayeski	Cell Cycle Gating of the Mammalian Sonic Hedgehog Signaling Pathway
Room C	**Aaron Conley**	The Politicization of Soccer and the Effects of the 2014 World Cup on Brazilian Politics
	Molly Malone	Job Training to Combat Poverty among Unemployed Coal Miners
	Thomas Oliver	Max Contracts: Savings or Reallocation?
Room D	**Jerica Bornstein**	Keeping Good Company: Creating Social Environments that Promote Goal Pursuit
	Joseph Coppiano	Individual Differences in Cognitive Control: Antisaccade Performance in Those with Schizophrenia and Low Cognitive Control
	Alan Gerlich	Neural Abnormalities in Ocular-Motor Inhibition in Schizophrenia, Bipolar Disorder, and First-Degree Relatives
Room G	**Anne Chen**	Sex-Ratio Imbalances and Risky Behavior in College
	Alexandra Edquist	Capital-Intensive Punishment: Reducing the High Costs of Federal Drug Incarceration
	Tiffany Toteno	Variables Affecting Attitudes toward Police
	Anthony Reyna	College Credit Experience and Financial Literacy
Room H	**Tiffany Washington**	Concussions from the Past Continue to Predict Present Symptomology Above and Beyond Mood Symptoms
	Victoria Moreira	EnVISIONeD: Examining VISion among Inpatients with Diabetes
	Brett McCardel	Neural Activation Changes Associated with Antisaccade Task Practice
Room I	**Isaiah Norris**	Hydrothermal Synthesis and Particle Size Study of Ancient Pigments

	Samuel Kennedy, Trenton Berding	Attacking the Fire and Fuel: Nano Formulation of Platin-A for Cancer and Associated Inflammation
	Joseph Sanchez	A Unique Mechanism in *Staphylococcus aureus* Ketopantoate Reductase
Room J	**Sheela Sheth**	Reducing Vitamin D Deficiency among Individuals Aged 50 and Older in Georgia
	Torre Lavelle	How to Tackle the Bike Share Helmet Problem
	Rahul Shah	Decreasing HIV Incidence in Russia through Needle & Syringe Programs

Oral Session VII: 3:30-4:45 p.m.
Athena Breakout Rooms A, B, C, D, G, H, I, J

Room A	**Greyson Clark**	Power Dynamics in Georgia's Poultry Industry, 1950-1965
	Laura Nelson	"Please Excuse Me as I Am in Need:" Bondage and Freedom in Civil War-Era Athens
	Anthony Sadler	Lester Moody: A Man, a River, and a Quest for Industry in the Twentieth Century South
	Seth Euster	Uncovering the Heritage of Slavery at the Shields Ethridge Farm: Memory, Identity, and Heritage Tourism
Room B	**Matthew Winn**	Interactions between Neutrophils and *Pseudomonas aeruginosa* Flagellum
	Raja Atchutuni	Distribution of Novel Genes in *Salmonella* Isolated from the Environment
	Kapil Chandora	Role of Mir-34a in Regulation of Macrophage M2 Phenotype
Room C	**Giovanni Righi**	Searching for Noise-Induced Phase Transitions in Ecological Systems
	Kelly Murray	Evidence for Indirect Effects of a Predatory Fish on the Size Distribution and Behavior of a Larval Caddisfly Species in Trinidadian Streams
	Mariana Satterly	Issues of Economic Efficiency in the Domestic Conservation Easement System
	Scott Saunders	A Mechanistic Explanation of How Regional Winter Climate Differences Influence Lyme Disease Distribution

Room D	**Anudeep Neelam**	ChuW as a Class C Radical SAM Methyl Transferase
	Allison Becker	Plasmonemes: A Novel Cell-Cell Interacting Structure in *Trypanosoma brucei*
	Allison Doyle	Measuring Brain Tissue Factor Levels in Malaria Infection
	Chris Slade	Genetic Assessment of the Role of TNF and its Receptors (RI and RII) in Placental Malaria Pathogenesis
Room G	**Julian Traas**	The Five-Fold Division: Shadow Personalities in Beckett's Three Novels
	Molly Dodd	Grace Kelly: Femininity in Film
	Hannah Klevesahl	Henry V: Legitimacy in Kingship and Film
	Chiara Tondi Resta	Reexamining a Little-Known Aphrodite Anadyomene Statue from Ancient Stabiae
Room H	**Scarlett Sumner**	Ecology and Genetic Characteristics of Haemogregarines in Fresh Water Turtles
	Shannon Burns	Riverwater and Seawater Dissolved Inorganic Carbon Endmembers for the Amazon River Plume
	Meg Babcock-Adams	Chemistry at Sea: An Expedition to the North Pacific to Analyze Deep Ocean Refractory Carbon (DORC)
Room I	**Fred Hohman**	3D Printing Techniques in Topology
	John Stroud	The Monkey Saddle
	David Flake	Membrane Electrode Assembly Preparation Utilizing Platinum Catalysts for Use in Polymer-Electrolyte-Membrane Fuel Cells
	Mehreen Sultana	Fabrication of Hinged Nano-Motors Utilizing Metal Assisted Chemical Etching, Nano-Sphere Lithography, and Physical Vapor Deposition
Room J	**Erin Hollander**	Increasing Nutrition through Genetically Modified Organisms
	Dayna Hardgrove	An Integrative Outlook on the State of Sustainable Development in Sarawak, Malaysia
	Kristyn Nock	*In Vitro* Protease Digestion and Reduction of Tropomyosin using Shrimp and Tropomyosin-Enriched Samples

Abstracts

The Association between High Intensity Athletic Participation and Chronic Ankle Instability

Edmund Afful
Dr. Cathleen Brown Crowell, Kinesiology, College of Education

Ankle sprains are a common athletic injury and may develop into Chronic Ankle Instability (CAI). CAI onset, determining factors, and relationship to sport participation remain unclear. The purpose of this study was to determine whether there was a relationship between participating in high intensity physical activity and CAI status. We hypothesized because of dynamic activity involved, there would a greater association of CAI in higher intensity sporting activities. In this retrospective review, recreationally active individuals' (90 female, 98 male, 21.0±2.9years, 173.3±9.6cm, 70.9±13.7kg) self-reported questionnaires quantifying ankle function were used to determine CAI status with appropriate cut-off values. Subjects also indicated the types of physical activities in which they participated. Activities that included jumping, cutting, and multiplanar motion (basketball, volleyball, field sports, etc.) were labeled as high-risk activities. Low-risk activities were those that did not require jumping, landing, and were uniplanar (walking, running, weightlifting etc.). A chi-square analysis was completed to assess the relationship between high-risk sporting activities and CAI status. There was a significant association (X^2=8.665 $p<0.01$) between those who participated in high-risk activities and the likelihood of having CAI. It appears those who participated in less demanding activities such as walking and lifting weights were less likely to report CAI, while those who did participate in high intensity activities were more likely to have CAI. High demand sports, with muliplanar movements and larger loading forces, may exacerbate symptoms of CAI. Future research should determine if specific sport participation is a risk factor for developing CAI.

Age and Formality in German Inalienable Possession Constructions

McKinley Alden
Dr. Vera Lee-Schoenfeld, Germanic & Slavic Studies, Franklin College of Arts & Sciences

In German, possessive constructions with inalienable prepositional phrase-embedded objects wield either an accusative- or dative-marked possessor. The construction in question is defined by the seemingly random interchangeability of the accusative and dative case, for example, "Das Mädchen kneift mich/mir in den Arm" ("The girl has me *Acc./Dat.* in the arm pinched," or, less literally, "The girl pinched me *Acc./Dat.* in the arm."). Recent studies show that formality tends to influence the case used in these constructions (Lee-Schoenfeld and Diewald 2013). This analysis posits that the preferred case is dependent on the age distribution of the speaker, specifically that younger speakers prefer the dative case to the more formal accusative case. The pilot data for this study was collected via survey, in which native speakers from Germany rated minimally paired sentences on a scale of *Very Inappropriate* to *Very Appropriate* for colloquial use. These results were then stratified by age of the participants in order to observe the relationship between this feature and the use of case. These ratings were imposed onto a numerical index, 1 for *Very Inappropriate* and 5 for *Very Appropriate*, and averages of the total responses of each stratum were taken. Within the aforementioned sentence pair, speakers 21 to 30 preferred the dative case, giving the accusative an average rating of only 3.5 (*Neutral*), whereas participants over age 61 gave the accusative an average rating of 4.67 (*Appropriate)* in the same sentences. This methodology has yielded results that will, when superimposed on preordained German case laws, generate valuable sociolinguistic

information on the relationship between age and formality.

Identification of a Novel O-Antigen and its Role in the Virulence of *Aeromonas hydrophila* Isolated from Diseased Catfish

Laura Alexander
Dr. Timothy Hoover, Microbiology, Franklin College of Arts & Sciences

Affecting primarily mature, market-sized catfish, *Aeromonas hydrophila* has caused the loss of millions of pounds of the largest product in America's aquaculture industry since 2009. This gram negative, rod-shaped bacterium causes septicemia in catfish, which is quickly followed by death. In an effort to characterize the virulence factors of *A. hydrophila,* genes suspected of playing a role in causing disease in catfish are being explored, such as those involved in the synthesis of O-antigen. In order to investigate its role in the virulence of *A. hydrophila,* a mutant lacking O-antigen ligase (Δ*waal*) was constructed and found to be avirulent in an aquarium model of infection using fingerling catfish. In order to further confirm this result and to determine how it allows the bacterium to infect catfish, the ligase (*waal)* gene was complemented in the mutant *in trans*, and visualized through SDS page analysis. Motility assays comparing the abilities of wild type, ligase mutant and ligase complement to swarm were conducted in order to both confirm complementation and determine if O-antigen affects motility in *A. hydrophila*. Upon discovery that the structure of *A. hydrophila* O-antigen is unique and possibly novel, we conducted a Multi-Locus Sequence Typing analysis using multiple housekeeping genes: *dnaJ*, *dnaX*, *recA*, *gyrB*, *rpoD*, and *gyrA* in an attempt to ascertain whether virulent strains of *Aeromonas hydrophila* may be classified as a novel subspecies. The results support the high degree of genomic homogeneity among virulent *A. hydrophila* strains and their tentative classification as a novel subspecies.

Effect of Folate on Lipid Accumulation and Proliferation in Human Primary Adipocytes

Courtney Alvis
Dr. Hea-Jin Park, Foods & Nutrition, College of Family & Consumer Sciences

Folate is an essential water-soluble vitamin that is involved in multiple cellular metabolisms including DNA synthesis and epigenetic regulation. Epidemiological studies report inverse associations between serum folate concentrations and body mass index; however the potential influence of changes in folate status on adipose cell development and metabolism has only been examined in animal models or a murine cell line, which is why this research is significant. The question of this study was to determine how folate influences differentiation and proliferation of human primary subcutaneous preadipocytes. Human primary preadipocytes, derived from subcutaneous adipose tissue of normal weight female donors (ZenBio Inc.), were exposed to 0.06, 6 or 60 uM folic acid (FA, oxidized form of folate; Sigma) and 5-methyltetrahydrofolate (MTHF, reduced form of folate; Merck). The impact of treatment on differentiation and proliferation were determined by AdipoRedTM Adipogenesis assay (Lonza) and CellTiter-Blue® Cell Viability assay (Promega), respectively. Results indicate that FA and MTHF decrease lipid accumulation in mature adipocytes after adjusting for cell number. Interestingly, MTHF, reduced form of folate, exhibited a greater inhibitory effect on lipid accumulation. Proliferation data suggest that FA had no effect on proliferation, while MTHF increased proliferation in a dose-dependent manner. Taken together, these results suggest that biologically active reduced forms of folate may have a greater effect on adipocyte proliferation and differentiation in human adipocytes. This study also supports preliminary findings in murine cell lines demonstrating the importance of maintaining

folate availability during adipose cell development.

Personal Distress and Response to Ambiguous Emotions

Ian Anderson
Dr. Brian Haas, Psychology, Franklin College of Arts & Sciences

Personal Distress (PD) is a tendency towards experiencing a high level of stress in response to intense emotional situations. Prior studies have shown that higher levels of PD are associated with higher social dysfunction, anxiety, and fearfulness. It is currently unknown, however, if PD is associated with the interpretation of ambiguous emotional stimuli and/or the speed at which people make emotion-based decisions. Based on prior studies, we predicted that higher PD scores would be associated with a negative emotional bias during the interpretation of ambiguous emotional stimuli. Furthermore, we predicted that higher PD scores would be associated with faster reaction times to negative emotional stimuli. To test these predictions, participants (N=59) performed a task in which brief movies of neutral faces morphed into emotional faces. Each participant was instructed to decide whether they believed the person in the image had just received either good or bad news. The three emotions presented were happy, fearful, and surprised. The results show that PD scores were positively correlated with a greater tendency to interpret surprised faces as negative ($r=.268$, $p=0.040$) as well as negatively correlated with fear response time ($r=-0.354$, $p=0.006$) and negatively correlated with reaction time when interpreting surprised faces as good ($r=-0.295$, $p=0.023$). These findings support the hypothesis that a higher PD score is associated with a negative emotional bias during the interpretation of ambiguous emotional situations and suggests that PD affects reaction time differently for negative and positive stimuli.

Distribution of Novel Genes in *Salmonella* Isolated from the Environment

Raja Atchutuni
Dr. John Maurer, Population Health, College of Veterinary Medicine

Salmonella is responsible for 1 million gastroenteritis cases in the United States each year. In the past, most illnesses were attributed to the consumption of fecally contaminated meat, milk, and eggs. However over the past 20 years, we have seen a significant increase in foodborne outbreaks linked to produce. Water is believed to be a potential source of *Salmonella* contamination in produce production. We have recently performed whole genome sequencing on a number of non-traditional *Salmonella* serovars, some of which have been isolated from the environment. We identified several unique mobile genetic elements, pilus, and metabolic genes. We screened environment *Salmonella* isolates by southern hybridization and PCR for the presence of several of these novel genes. We identified a large molecular weight, conjugative plasmid in *S*. Mikawasima, and found that this plasmid was widely disseminated among our environmental isolates. We also identified a pilus operon homologous to the *E. coli* common pilus that was also widely distributed in our isolates. However, we also found certain lysogenic phages that were limited to a handful of *Salmonella* isolates. From screening these different environmental isolates, we observed that the water isolates had a different pattern of genes present, compared to *Salmonella* that inhabit animal isolates. The variation in the distribution of genes in the water isolates from the animal isolates explains the adaptation of these particular *Salmonella* strains to the aquatic environment.

Abstracts

Chemistry at Sea: An Expedition to the North Pacific to Analyze Deep Ocean Refractory Carbon (DORC)
Meg Babcock-Adams, CURO Summer Fellow
Dr. William Miller, Marine Sciences, Franklin College of Arts & Sciences

In the summer of 2013, I participated in a 3-week oceanographic research cruise aboard the *RV Melville* in the North Pacific. There we collected water from 33 stations, from multiple depths, and ran onboard experiments. These experiments were designed to measure several different chemical components, all working towards obtaining a comprehensive picture of the deep ocean refractory carbon (DORC) pool and the role of marine photochemistry in its removal from the ocean. The amount of dissolved organic carbon (DOC) in the entire ocean, of which a large portion is DORC, is equal to that of carbon dioxide (CO2) in the atmosphere; therefore, interconversion between DOC and CO2 is essential to understanding air-sea carbon exchange and global carbon budgets. Fueled by solar energy, photochemistry converts DOC in the ocean to CO2 and CO, which can be released to the atmosphere. This is the central idea that my project was based on. While the entire Miller lab worked together in conducting experiments, I directed most of my time to measuring CO accumulation in seawater throughout long-term exposures in a solar simulator. Using experimentally determined ratios, CO can be related to CO2 and consequently, the total mass of carbon gases that may be released into the atmosphere as a direct result of marine photochemistry can be estimated. Shipboard results look promising and follow-up experiments are underway to interpret results for contribution to new calculations of the role of DORC and photochemistry in the global ocean carbon budget.

A Mythological Chain of Oppression
Manisha Banga
Dr. Benjamin Wolkow, Classics, Franklin College of Arts & Sciences

This research examines a chain of oppression that connects the ancient Greek mythological figures of Hades, Persephone, and Adonis—ancient characters who are seldom connected in modern retellings but whose stories are surprisingly intertwined. The focus of the research will be on the following: How does Hades' oppression and objectification of Persephone lead to Persephone's oppression and objectification of Adonis? Moreover, how can these stories be related? In order to examine these relationships, the researcher will reference both primary and secondary sources, including translations of the original myths and critical essays on the myths themselves. The research will involve a primarily analytical and literary examination of the archetypes that Persephone's relationships embody, as well as the application of these archetypes in the modern world. Additionally, the research will examine the descriptions of these characters in their original myths and will place these descriptions in conversation with each other in order to further explore the characters' interconnectedness. Ultimately, classical, literary, and feminist viewpoints on the myths will be considered in order to examine the myths in ways that have not yet been explored.

Game Theory and Literature
James Barrow
Prof. Michael Lynch, Political Science, School of Public & International Affairs

William Poundstone, writes "[g]ame theory is a study of conflict between thoughtful and potentially deceitful opponents" (Poundstone, 1993). One problem with game theory is that scientists typically examine an event of the past and attempt to explain why certain results emerged but they assume one thing: that all

actors acted rational. This is not always the case; in fact most people act irrationally. It is through literature that we observe how irrational people behave and the consequences that ensue. As Walter Wangerin Jr. wrote in *The Orphean Passages*, "[i]n order to comprehend the experience one is living in, he must by imagination and by intellect be lifted out of it. He must be given to see it whole; but since he can never wholly gaze upon his own life while he lives it, he gazes upon the lift that, in symbol, comprehends his own" (Dickerson & O'Hara, 35). It is only through literature and looking at an experience that was not our own, but one we can relate to, that we are truly able to study game theory. Therefore, the point of this research is to examine literature of the ages, from the Bible to Shakespeare to Jane Austin to J.K. Rowling, and observe the game theory that occurs between characters, not rational actors.

Light-Dependent Protein Degradation in *Plasmodium falciparum*

Kristen Bascombe
Dr. Vasant Muralidharan, Cellular Biology, Franklin College of Arts & Sciences

Malaria is a deadly parasitic disease, and there is widespread resistance against anti-malarial drugs. In order to develop new therapies, the biology of malaria parasites must be further understood. Gene knockdown methods used in other organisms are not effective in *Plasmodium* species. To study parasite biology we currently use drug-dependent degradation domains that require costly and toxic chemicals. Recently, light-dependent protein degradation has been reported in yeast. The purpose of this research is to develop an optogenetic tool for protein knockdown in *Plasmodium falciparum* to determine their roles in the parasite's biology. A preliminary *in vitro* assay for light-dependent protein degradation will be developed using purified proteins and *P. falciparum* lysates. If protein degradation is successful *in vitro*, *in vivo* experiments in *P. falciparum* will follow. Expression constructs for GFP, and GFP fusion proteins (GFP-Ddd and GFP-psd) were created using PCR, restriction enzyme digestion, and ligation into the pET28a vector. The resulting constructs were analyzed using diagnostic restriction digestion and DNA sequencing. The verified constructs were transformed into BL21 *E. coli* for protein production. Proteins purified from *E. coli* via HIS-tag affinity chromatography will be incubated with *P. falciparum* lysates under protein degradation and protein stabilization conditions. Protein degradation will be assessed via visual confirmation of green fluorescence and western blot with anti-GFP antibodies. This new tool for studying *P. falciparum* will help identify proteins necessary for blood stage infection and provide targets for new antimalarial drug development.

Clinoptilolite Formation in the Lower Floridan Aquifer

Philippe Bauchau
Dr. Paul Schroeder, Geology, Franklin College of Arts & Sciences

Clinoptilolite is a natural zeolite that most commonly forms in volcanic tuffs by devitrification (i.e., the transformation of amorphous glass to crystalline phases). A mineralogical study of the Miocene Lower Floridan Formation at Cockspur Island, Georgia by Ostrowicki (2012) reveals the unusual occurrence of clinoptilolite within a quartz-bearing limestone. This limestone hosted zeolite was examined by electron microprobe analysis and results indicate the clinoptilolite bears structural Na-K-Ca-Mg, giving it an average empirical formula of (NaK2MgCa1.5Al8Si30O72*24H2O). Thermodynamic modeling using Geochemist's Workbench® shows that a Na-clinoptilolite is more stable than Ca-clinoptilolite when inputting the present day pore water chemistry as reported by the U.S.

Geological Survey (Gonthier, 2012). When comparing the non zeolite-bearing Upper Floridan Formation pore water chemistry to the Lower Flordian pore waters, thermodynamic models favor the formation of Na-clinoptilolite in the Lower Floridan. The depositional environments were likely in a tropical marine setting, however when clinoptilolite is present, it suggests a higher silica activity, perhaps sourced from more basic waters and diatomaceous blooms. The question "when during diagenesis (early versus late) did clinoptilolite originate in the aquifer?" is still being considered. The occurrence of clinoptilolite is important because clinoptilolite acts as an ion exchanger for heavy metals and ammonia. The effect of clinoptilolite on formation factors used to evaluate aquifer storage potential is important, particularly as coastal communities in the SE United States look to manage fresh water sources.

Plasmonemes: A Novel Cell-Cell Interacting Structure in *Trypanosoma brucei*

Allison Becker
Anthony Szempruch, Graduate Research Assistant
Dr. Stephen Hajduk, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Trypanosoma brucei is the causative agent of human African sleeping sickness and the cattle-wasting disease Nagana. During the mammalian infection the parasite is exposed to the host immune system. To subvert the adaptive immune response, trypanosomes express a single variant surface glycoprotein (VSG) that prevents antibody recognition of other cell surface components. The VSG can undergo antigenic variation allowing for immune evasion. It has been hypothesized that while in the blood stream cell-cell and cell-host interactions take place. Recent research has shown that trypanosomes produces exosomes, small lipid vesicles, possibly as a means of communication during stress. The production of exosomes is highly correlated with the presence of plasmonemes. These plasmonemes are easily observed by Differential Interference Contrast (DIC) microscopy and appear at the posterior end of the parasite. The posterior end is the location of the flagellar pocket, the only site of endocytosis and exocytosis in the cell. Our research determined physiologically relevant conditions that increase the formation of plasmonemes. The increased production of plasmonemes, mediated by biological stresses, appears to increase cell-cell interactions and may serve as another mechanism for cell communication.

Differential Expression of Genes Involved in the Insulin Growth Factor Pathway in Breast Cancer

Briana Bennett
Dr. Melissa Davis, Genetics, Franklin College of Arts & Sciences

Insulin Receptor Substrate 1 (IRS1) and Insulin-like Growth Factor Binding Protein 6 (IGFBP6) are key players in the Insulin Growth Factor (IGF) pathway, and their expression is often altered in breast cancer subtypes. IGFBP6 binds to both IGF1 and IGFII, normally with higher affinity to the latter. This interaction modulates the activity of the IGFs in the cell, and IGF1 modifies IRS1 via post-translational mechanisms. In order to determine if the levels of IGFBP6 and IRS1expression varies among normal breast epithelial cells and cancerous cells, we used qPCR to obtain quantitative transcript levels and immunofluorescence microscopy to verify the gene product levels. IGFBP6 is overexpressed in Basal-like breast cancer cells and underexpressed in ER+ cancer cells compared to normal cells. IRS1 has higher levels of expression in ER+ cancer cells compared to normal. Utilizing immunofluorescence microscopy, IGFBP6

shows higher levels of fluorescence in the Basal-like cancer cells and lower levels in the ER+ cells. The microscopy also revealed that IGFBP6 is localized to the cytoplasm and shows small areas of concentration where it is likely binding to its substrate(s). The images obtained of IRS1 show higher levels of fluorescence in ER+ cells, confirming its qPCR results. The differential expression of these genes may affect the properties of cancerous cells as the growth factor pathways are possibly linked to cancer subtype etiology. Further investigation into the expression levels of other genes in the insulin pathway will provide insight into how it could be a potential target for treatment.

The Creation of an Anticancer Prodrug – Combining Aspirin with Cisplatin

Trenton Berding
Prof. Shanta Dhar, Chemistry, Franklin College of Arts & Sciences

Cisplatin is a chemotherapeutic drug which targets the DNA of cancer cells causing apoptosis. Treatment with cisplatin commonly demonstrates severe adverse side effects related to inflammation, such as nephrotoxicity and ototoxicity. Creation of a prodrug, Platin-A, from the synthesis of aspirin and cisplatin, has been found to reduce the inflammatory complications and cytotoxic effects of treatment with cisplatin alone. These findings highlight the advantages of using a prodrug to decrease inflammation associated with the delivery of a chemotherapeutic agent.

Embodiment and Altruism

Hania Bisat, CURO Graduation Distinction
Dr. Leonard Martin, Psychology, Franklin College of Arts & Sciences

Embodied cognition is the idea that physical factors in a person's environment, whether the temperature, the surface a person is sitting on, or the position of certain items in a room, subconsciously affect how people perceive their surroundings, as well as how they respond to them. One of the most controversial studies on this topic is that of Williams and Bargh (2008), in which participants who were asked to hold a warm cup of coffee were more generous and more likely to see others in a positive light than those who were asked to hold a cold cup of coffee. We sought to replicate and extend this study. We gave participants various personality tests, asked them to hold a warm or cold cup of coffee, gave them Bargh's Impression Formation task, and noted if they volunteered to help the experimenter pick up a box of dropped pencils after the experiment was officially over. We hypothesized that those who held a warm drink would be more likely to rate the person in Bargh's computer task more warmly, and would also be more likely to help the experimenter. We also hypothesized that participants who labeled themselves as conservative would be more influenced by the temperature of the drink they held than liberals. If our results mirror those of Williams and Bargh, they will serve as further proof of the subconscious effects the environment has on a human's feelings, perception, and actions.

Response of Microbial Nitrification and Denitrification to Redox Shifts in Beach Sand

Laurence Black
Dr. Samantha Joye, Marine Sciences, Franklin College of Arts & Sciences

The concentration of atmospheric nitrous oxide (N2O), one of the most important greenhouse gases, has increased by 18% (270 to 320 ppb) since the industrial revolution. Human activity, such as agriculture, has increased the amount of fixed nitrogen entering the natural nitrogen cycle, in turn increasing microbial N2O production. Oxygen availability is a key driver of N2O production rates by nitrifying and denitrifying

microorganisms, and oxygen availability in beach sands may fluctuate in response to tidal oscillation. Here we test the hypothesis that N2O concentrations in these sands will increase following sudden changes in oxygen availability. Beach sand was collected from Cabretta Island, a barrier island on the Georgia coast. Sand was enriched with either nitrification (NTR) substrates (ammonium (NH4+)) or denitrification (DNF) substrates (nitrate (NO3-) and organic carbon) and incubated in bottles under oxic or anoxic conditions. After four days, some bottles were switched from oxic to anoxic conditions and vice versa while others remained unchanged. The concentration of nitrous oxide in the headspace of each bottle was measured before and after this switch using a gas chromatograph with an electron capture detector. The data generated suggest that microorganisms have a greater tendency to produce sudden spikes and depletions of N2O due to fluctuations in nutrient and oxygen availability. Tides drive this type of redox oscillation in beach sands, potentially making them an important source of N2O to the atmosphere.

And Justice for All: Scale, Solidarity, and Integrational Organizing in the Climate and Immigrant Justice Movements in Georgia

Sara Black, Foundation Fellow
Dr. Nik Heynen, Geography, Franklin College of Arts & Sciences

Georgia enters 2014 as a state with some of the most draconian anti-immigrant laws in the U.S. and two of the most carbon-intensive coal plants in the world. The immigrant justice and climate justice movements have active front lines in Georgia, peopled by local grassroots organizations navigating issues primarily framed at the state level, albeit rich with the context of national movement strategy. In the fall of 2012, student organizers from UGA Beyond Coal and the Undocumented Student Alliance at UGA coordinated a direct action tactic that offered not just statements of solidarity, but a unified message and underlying narrative justifying collaboration between immigrant and climate justice activists. This paper documents the continuing effort to deepen the relationships of solidarity and collaboration that were started with that action, and asserts that these collaborative spaces, which are not seen as strategically efficient, nevertheless create power in the form of relationships, knowledge, and narrative. Using a participant action research methodology, I have worked with local organizers to identify justifications and avenues for collaborations spanning a gradient of strategic value. In developing an underlying narrative that supports and invigorates collaborative action, local actors resisting primarily local ordinances offer frames rooted in the politics of scale which encompass and integrate the large-scale drivers of climate change and migration. Translating these frames into local action has the potential to challenge the whiteness of the climate movement and to tie more deeply the story of climate disruption to the story of economic disruption and vulnerability.

***Pax6* Expression in the Adult Sey and Wildtype Brain**

Caroline Blatcher
Dr. James Lauderdale, Cellular Biology, Franklin College of Arts & Sciences

Pax6, a member of the Pax family of transcription factors, is expressed in distinct regions of the central nervous system, specifically the eye, forebrain, hindbrain, and spinal cord. It is critical for development of the eye as well as development and patterning of the forebrain, including establishing dorsal-ventral boundaries, neuronal migration, and axon guidance. Aniridia is a human congenital condition characterized by a semidominant mutation in *Pax6*. Although well-studied for the eye phenotypes, relatively little is known

about the effects of the *Pax6* mutation on the forebrain. The mouse model for Aniridia, *Small eye (Sey),* also has a mutation in one copy of the gene, making it a good rodent model for understanding the human condition. To date, no studies have attempted to find out if there are any differences in the forebrains of *Sey* mice at the cellular level. The attempt of this study was to determine any potential differences in the structure and expression pattern in the brain of *Small eye* mice compared to wild-type. Structural analyses were performed by hematoxylin and eosin staining (H&E) on paraffin-prepared histological sections. Differences in protein expression were tested using immunohistochemistry, also on paraffin-prepared histological sections of the brain. Expression levels in adult brains were also measured at the level of mRNA by whole mount RNA *in-situ* hybridization. The differences found in this study could lead to understanding some of the non-eye-related symptoms experienced by people with Aniridia.

Keeping Good Company: Creating Social Environments that Promote Goal Pursuit

Jerica Bornstein
Dr. Michelle vanDellen, Psychology, Franklin College of Arts & Sciences

We examined how people look for goal support, namely how others' self-control affects how much time people wanted to spend with them. Specifically, we examined how individuals' own self-control affects their feelings towards people they perceive to be (a) high versus low in self-control or (b) helpful versus unhelpful. In Study 1, participants were randomly assigned to write about someone they recently met whom they judged to have either high or low self-control. Results indicated that participants with high self-control reported wanting to spend more time with people who also had high self-control relative to people who had poor self-control. In Study 2, students in a research statistics class were invited to take part in a survey about their feelings on the course. Students reported about a friend who was helpful in their goal pursuit and a friend who interfered with their goal pursuit. Results indicated that when high self-control participants were nervous before the first exam they wanted to spend more time with their friend who would help their goal pursuit and avoid the friend who would interfere with their goal pursuit. However, when high self-control students were not nervous before the first exam they did not show a preference between their helpful and interfering friend. Trait self-control predicts preferences to spend time with others who have high trait self-control, particularly when individuals feel like they need help with their goals pursuits.

Evaluation of Mitochondria in Persons with Mitochondrial Myopathies Using Near-Infrared Spectroscopy

Hannah Bossie, Miller Singleton
Dr. Kevin McCully, Kinesiology, College of Education

The aim of this study is to measure skeletal muscle mitochondrial function in individuals with mitochondrial myopathies (MITO) and compare these results to controls. These measurements will be made utilizing near-infrared spectroscopy (NIRS). The NIRS method has been used to assess mitochondrial function in individuals with various chronic conditions, including spinal cord injury, multiple sclerosis, cystic fibrosis, and heart failure. I hypothesize that patients with mitochondrial myopathies will have impaired mitochondrial function, and this will correlate with clinical symptom severity. The study will be performed in the Exercise Muscle Physiology Laboratory in the Kinesiology Department. I am collaborating with a clinical geneticist, Dr. Fran Kendall, who works specifically with mitochondrial myopathies. Participants with and without a genetically

confirmed diagnosis of mitochondrial myopathy (n=20 each) will be tested after we get IRB approval. Several recent review papers have highlighted the need for a noninvasive method that can monitor the treatment of people with mitochondrial myopathies, including one by Dr. Kendall. Because the NIRS test that we will use is noninvasive, and takes 30 minutes or less, NIRS has the potential to fill this important need. The NIRS test can serve as an important adjunct test for diagnosis of mitochondrial myopathies. It can also lead to future studies evaluating treatments for mitochondrial myopathies with various antioxidant supplements and or pharmacological interventions.

Marketing an Online Based Education Platform

Noah Boswell, CURO Honors Scholar
Dr. Piyush Kumar, Marketing, Terry College of Business

In today's world we are in the Wild West of free online education. While there are established websites such as Khan Academy and Coursera, they are not perfect and can certainly improve. It is important that these education platforms improve too, as the rising cost of college is making it increasingly harder for people to get the knowledge they need. Our goal with Faqulty.com is to attempt to make a website where people can be the student and the teacher for free. Our website will offer a way for people to aggregate information on a subject and structure it in a course-like manner for anyone to see. People will then be able to go to this website and be able to learn about a subject from the viewpoint of multiple people. Our directive is to now make sure that Faqulty.com is marketed well enough so that we can achieve these goals of improving the free online education space. If we can achieve this, this website will be a great tool and a valuable resource for everyone who accesses it.

What Predicts Willingness to Support a Partner's Smoking Cessation Attempt?

Savannah Boyd
Dr. Michelle vanDellen, Psychology, Franklin College of Arts & Sciences

People are constantly pursuing new goals, often with the expectation of support from their significant other. In this project, we focused on the goal of smoking cessation. Compared to individuals not partnered with another smoker, dual-smoker couples are less likely to both try to quit smoking and be successful. This issue prompted us to further examine factors that predict support during an individual's quit attempt. Participants were recruited via a crowdsourcing website and were screened to ensure they were in a relationship with a partner who smoked at least ten cigarettes per week. During the survey, participants answered questions about their demographics as well as their own smoking status. Then they completed the Partner Interaction Questionnaire, which measured the intended frequency of positive and negative support the participant would provide their partner if he or she attempted to quit smoking. Lastly, participants reported their own motivation to quit smoking. Analyses show that smokers are less willing than non-smokers to provide support. Among smokers, we found that self-directed beliefs (i.e., their own motivation to quit smoking) and partner-directed beliefs (i.e., worry about their partners' smoking) increased willingness to provide support. These data show there is a differential amount of support given by smokers versus non-smokers. Furthermore, beliefs about their own and their partners' smoking affect their willingness to provide support among smokers. We hope that this study clarifies the effect of smoking status on support while stimulating research to further examine the dynamics of dual-smoker couples.

Abstracts

Comparison of Peak Vertical Ground Reaction Forces between Individuals with Patellar Tendinopathy and Asymptomatic Individuals

Jonathan Brown
Dr. Cathleen Brown Crowell, Kinesiology, College of Education

Patellar tendinopathy (PT) is common in jumping sports, but mechanisms causing PT are unclear. Our purpose was to compare peak vertical ground reaction forces (VGRF) between individuals with symptomatic PT and healthy control participants during a jump landing. We hypothesized the PT group would display greater peak VGRF compared to healthy participants. Forty-four individuals completed this study; 23 had self-reported PT symptoms and a Victorian Institute of Sport Assessment-Patella (VISA-P) of <80 indicating decreased knee function (14 female, 9 male, age 21.6 ± 3.5years, height 174.2 ± 8.3cm, mass 70.8 ± 10.9kg, VISA-P 64.2 ± 8.5), while 21 were healthy with no history of knee joint pain (female 12, male 9, age 22.0 ± 3.4years, height 175.2 ± 10.6cm, mass 72.6 ± 12.6kg, VISA-P 100.0 ± 0.0). Participants performed 5 trials of two-legged drop jump landings followed immediately by a 50% maximum vertical jump on a force platform. The peak VGRF of the PT participants' affected limb and controls' matched limb were averaged over 3 trials. The average peak VGRF was normalized to body mass (BM). Independent samples *t*-tests ($p<.05$) identified differences between the two groups. The PT group had significantly ($p<.001$) lower scores on the VISA-P compared to the control group. PT peak VGRF (2.06 ± 0.41xBM) was lower than controls (2.30 ± 0.56xBM), but the difference was not statistically significant ($p=.11$). Peak VGRF may actually be decreased in PT compared to control participants. Peak VGRF may not be related to PT pain and decreased function at the knee.

The Importance of Local Grassroots Organizations in the Reshaping of Afro-Argentine Consciousness

Tiffany Brown, CURO Summer Fellow
Dr. Nicolás Lucero, Romance Languages, Franklin College of Arts & Sciences

In the 19th century, Afro-Argentines made up roughly 33% of the total population of Buenos Aires. Yet within the last century, the Afro-Argentine population has been decimated so thoroughly that many do not acknowledge their existence in Argentine society. The narrative of this group consequently has been silenced and few studies exist pertaining to it. In recent years, Argentina has experienced a resurgence in "orgullo negro" or black pride. Afro-Argentine groups like *Misibamba* and *AfricaVive* have dedicated themselves to promoting awareness and reconstructing the Afro-Argentine's role in Argentine history and society through cultural events and programs. The objective of this study is to document the role of grassroots organizations and local efforts in the reconstruction of the Afro-Argentine identity. The bulk of this research centered on interviews with individuals from grassroots organizations such as *Casa de Africa* and *AfricaVive*, as well as more informal interviews with white Argentine citizens. Although I am still synthesizing data from these interviews, the common thread that I found amongst these various groups is a concerted effort in promoting recognition of their daily lived experiences and hardships as they focus on educating both the government and the general populace of Argentina. This preliminary study serves to spread awareness about the importance of self-identity and local organization in the fight to redefine and reconstruct Afro-Argentine history.

Abstracts

Sphingolipid Metabolism and the Biological Clock in *Neurospora crassa*

John Brunson
Dr. Jonathan Arnold, Genetics, Franklin College of Arts & Sciences

The bread mold *Neurospora crassa* is a model organism that has been used for studies of the biological clock for decades. Clock function is generally conserved across many different species, and by studying the clock in a simple model like Neurospora, we can learn more about how our own biological clock functions. This area of research is growing in importance as humans take on more and more "alternative" sleep schedules and increase their exposure to sources of artificial light at odd hours. Disorders of the biological clock, such as Sundowner's Syndrome, are also reported to affect proper sleep cycles. What's more, proper knowledge of clock function may have implications for medicine, like knowing when to administer certain medicines. In this particular research effort, we look at the effects of ceramide synthase knock outs, namely *lag-1* and *lac-1*, on the clock in Neurospora. Mutants of the *bd* gene are used in conjunction with *lag-1* and *lac-1* knockouts in order to visualize the clock phenotype on race tubes. We also use cell counting methods to determine a chronological senescence phenotype for the double mutants, *lag-1KO bd* and *lac-1KO bd*. We find that both *lag-1KO bd* and *lac-1KO bd* display a unique "double banding" phenotype when run on racetubes, and that *lac-1KO bd* has a unique senescent phenotype different from *lag-1KO bd* when run through a cell counter over a 7-day experiment on minimal media. We aim to confirm the *lac-1KO bd* results using plasmid transformation with *lac-1* under a qa-inducible promoter.

Riverwater and Seawater Dissolved Inorganic Carbon Endmembers for the Amazon River Plume

Shannon Burns
Dr. Patricia Yager, Marine Sciences, Franklin College of Arts & Sciences

As the world's largest river, the Amazon River ecosystem significantly influences the global carbon cycle. Previous research identified the Amazon River Plume as a natural sink for atmospheric carbon dioxide (CO2). However, anthropogenic-driven changes to the tropical hydrologic cycle may alter the photosynthesis-respiration balance in the river's associated waters, impacting atmospheric CO2 concentrations and feedback to climate change. Here we improve calculations of the offshore sink's size using a mixing model between the river and offshore seawater. Key variables are the dissolved inorganic carbon (DIC) endmember concentrations at the river mouth and offshore, which are used to determine the ΔDIC attributed to biology (ΔDICbio). Without precedent, in July 2012 ANACONDAS expedition scientists collected measurements at the river's mouth using a CTD (Conductivity, Temperature, Depth) recorder/Niskin bottle rosette at eight stations and an uncontaminated surface seawater pumping system while underway. Salinity (S) and DIC were measured using a SOMMA (Single Operator Multi-parameter Metabolic Analyzer) system connected to a coulometer. From this data, seawater (s) and riverwater (r) DIC endmembers were identified as µmol C/kg () and µmol C/kg (), respectively. Mixing model results using these new endmembers suggest net heterotrophy nearshore (0-20ppt) and net autotrophy farther offshore (>20ppt), differing from previous studies that suggested either reduced net heterotrophy in the inner plume or sustained net autotrophy. We suspect that light limitation due to riverine sediments influences inner plume water biology. Further analysis of factors influencing the ΔDICbio

will better determine the plume's role as a carbon sink and anthropogenic activity sensitivity.

Purification and Characterization of APAP1-Like Proteoglycans from Rice Suspension Culture Media

Stanislav Bushik, CURO Summer Fellow
Dr. Debra Mohnen, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Rice is one of the most commonly grown and cultivated plants in the world. It is primarily used as a food crop which is cheap to grow and yields high returns. The non-edible structures of the rice plant may also be used to produce biofuels. If the rice plant could be modified to decrease the recalcitrance of the biomass to deconstruction and simultaneously maintain good growth under standard or harsh environmental conditions, the result could be greater food stocks around the world and a source of biomass for the cost effective and efficient manufacture of biofuels. The objective of this research is to identify specific genes responsible for cell wall structures in the plant cell. If these genes could be modified to yield biomass with improved properties, the objectives described above could potentially be accomplished. These genes can be identified using a specific process that has been shown to identify novel proteoglycan structures in the plant cell. First, proteins, glycoproteins, and/or proteoglycans are purified from the rice suspension culture cell media using High Performance Liquid Chromatography (HPLC) and the proteins are sequenced using proteomics. Once sequenced, the genes that encode these glycoproteins are identified by examining the rice plant genome. The goal is to produce knock-down, knock-out, and over-expression rice plants that can be studied in regards to their cell wall, growth and development phenotypes, and their biomass feedstock potential. At this point, the sugar compositions of several selected samples were analyzed. Preliminary data suggest that these samples are, as expected, arabinogalactan proteins (AGPs). Two selected AGP fractions are xylosylated, possibly similar to the structure of arabinoxylan-pectin-arabinogalactan protein 1 (APAP1).

Parenting Stress, Emotion Dysregulation, and Emotion Coaching as Predictors of Child Behavior Problems in the Context of SES and Race

Minhnguyen Cao, CURO Graduation Distinction
Dr. Anne Shaffer, Psychology, Franklin College of Arts & Sciences

The goal of this study is to examine the relationship between parenting factors (stress, emotion dysregulation, and emotion coaching) and child psychopathology, while exploring socioeconomic status (SES) and race as moderators. This research is motivated by ongoing needs to identify family-level predictors of child behavior problems, while considering the importance of social contextual factors that may lead to individual variability in these relations. The following hypotheses were tested: 1) higher parenting stress, higher parental emotion dysregulation (ED), and lower levels of parental emotion coaching will predict greater child internalizing and externalizing problems, and 2) these relations will be moderated by socioeconomic status and race. The study used data obtained from a community-based sample of 34 families from racially and economically diverse backgrounds. Bivariate correlations indicated that parenting stress was significantly related to child internalizing (r=.43, p<.05) and externalizing behaviors (r=.56, p<.01). However, ED was not significantly related to internalizing (r=.26, p=.13) or externalizing (r=−.20, p=.25) behaviors. Similarly, coaching was not significantly related to either internalizing (r=−.01, p=.97) or externalizing (r=−.15,

p=.44) behaviors, although most relationships were in the predicted direction. Regressions were performed to test the last hypothesis with parenting stress and emotion dysregulation as predictors. Results indicated a significant interaction in one instance: at high levels of stress, African American mothers reported higher levels of externalizing problems than White mothers (β=.49, *p*<.05). These findings suggest the importance of considering demographic differences, although future studies would benefit from larger sample sizes to improve statistical power, as well as using multi-informant reports of child problems.

Pigmentation and Protein Glycosylation in the Drosophila Embryo

Leah Caplan
Dr. Michael Tiemeyer, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Glycoprotein glycans are important for cell-cell interactions and intracellular communication, but very little is understood about the genetic and biochemical pathways that influence cell- and tissue-specific glycoprotein glycosylation. We have isolated mutations in the fruit fly, *Drosophila melanogaster*, that alter glycoprotein glycosylation in the embryonic nervous system. The phenotypes of two of these mutations (designated *sff* and *ms16*) are strongly affected by mutations in the *white* gene. In Drosophila, the *white* gene plays a role in eye pigmentation, but its absence (*w-*) is also accompanied by neurological and behavioral defects, suggesting that this pigmentation gene functions in other metabolic processes. Many other genes also affect eye pigmentation in Drosophila, including *cinnabar, brown, henna*, and *vermillion*. To determine whether the pigmentation pathway itself, or some undefined autonomous function of the white gene, is more important for the tissue-specific glycosylation defects that we have detected, we screened other pigmentation mutants for possible genetic interactions with *sff*, *ms16*, and *white*. We assessed neural-specific glycosylation in pigmentation mutants and in transheterozygous combinations of pigmentation and glycosylation mutants by staining with anti-HRP antibodies, which detect the production of a specific N-linked glycan epitope on neural glycoproteins. All 4 pigmentation mutants exhibited genetic interactions with the glycosylation mutants, indicating that multiple components of pigment production pathways impact glycoprotein glycosylation. Further experiments will define the specific molecular contribution of these pigmentation genes to Golgi processing of N-linked glycoprotein glycans.

A Storyworld with Incalculable Authors: Defining, Finding and Committing Narrative in the World of Social Media

Julia Carpenter
Dr. Elizabeth Davis, English, Franklin College of Arts & Sciences

New media theorist Lev Manovich once declared database and narrative "natural enemies." But tweet by tweet and story by story, he's being proven wrong. Tools like Storify, Scoop.it, and even Twitter's own "custom timeline" function enable users to curate, select, and order data into a narrative — effectively, to narrativize the database. A narrative built over Twitter, for example, is an instantaneous reconciliation of prior with emergent knowledge, and in building from a vast database, "author" and "narrator" roles disappear as "community member" roles become more important. These expanded powers of agency and disruption in temporality create a hallmark intimacy in social media narrative. In deciding what constitutes a story and what "counts as" a narrative, literary critics and social media story analysts can learn from journalists, who take vast amounts of data and synthesize it in a

way that's understandable (and palatable) to audiences. This presentation will examine several different social media feeds as narrative, the roles their creators and community members play in the story inception, and the tools that enable this kind of storytelling, thereby analyzing story creation from beginning to end. Such an examination further provides a method for measuring reader engagement within the database itself.

Role of Mir-34a in Regulation of Macrophage M2 Phenotype

Kapil Chandora
Dr. Donald Harn, Infectious Diseases, College of Veterinary Medicine

Inflammation plays an important role in providing protection against infection as well as in the development of metabolic and cardiovascular diseases. Uncontrolled inflammation is detrimental due to tissue damage and a shift in cellular metabolism and insulin sensitivity. Macrophages play important roles in regulation of inflammation as macrophage M1 or M2 phenotypes can promote or suppress inflammation respectively. M1 (classical activation) phenotype is driven by Th1/pro-inflammatory cytokines (IFNg, IL-12, TNFa) while Th2 or anti-inflammatory cytokines (IL-4, IL-13, IL-10) drive M2 (alternative) phenotype. M2 macrophages suppress inflammation, repair tissue damage, and improve insulin sensitivity. However, little is known regarding regulation of M2 macrophages *in-vivo*. In this regard, my project focused on investigating the role of microRNAs in controlling macrophage phenotype. Using various cellular biological techniques (flow cytomtery, qRT-PCR, reporter assays, western blots) we determined that mir-34a regulates macrophage M2 phenotype *via* targeting the IL-4Ra-STAT6 pathway. Specifically, macrophages transfected with mir-34a mimics failed to undergo M2 phenotypic change, associated with reduction in the expression of STAT6 transcription factor (M2 mediator), suggesting that mir-34a controls STAT6 expression to regulate M2 polarization. Further, we have bred heterezygous (mir34a+/-) male and female mice in order to obtain homozygous mir-34a deficient mice for *in-vivo* validation of our findings. Overall, findings from this study suggest that mir-34a is a potential candidate in developing therapeutic interventions against inflammatory diseases.

Proteomic Identification and Analysis of Potential Biomarkers for Pancreatic Adenocarcinoma

Joshua Chang, Foundation Fellow
Peng (Linda) Zhao, PhD
Dr. Lance Wells, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Pancreatic adenocarcinoma is currently the fourth leading cause of cancer-related death in the United States even though it is not in the top 10 for diagnosed cancers. The lack of specific methods for its detection has kept five-year survival percentages particularly low; the identification of a pancreatic cancer biomarker would thus allow for its earlier diagnosis and an increased overall survival rate. As protein alterations are commonly observed in many cancers, proteomic analysis is often the starting point for such investigations. Pancreatic ductal fluid samples were collected from four patient groups – normal, intraductal papillary mucinous neoplasm, pancreatitis, and adenocarcinoma – and are being assessed for variations in proteins and glycans. While we have already detected preliminary changes in the proteome, we are currently optimizing proteomic methods and combining this with glycomic data being generated in the group. Also, we will be examining whether observed changes in protein expression can also be observed in serum of the same patients. If specific glycoproteins can be demonstrated to have

altered expression in precancerous and/or cancerous samples, a simple, non-invasive biomarker for pancreatic adenocarcinoma can then be readily produced and applied in clinical settings.

Sex-Ratio Imbalances and Risky Behavior in College

Anne Chen, CURO Summer Fellow
Dr. Christopher Cornwell, Economics, Terry College of Business

On today's college campuses, female students make up almost 60 percent of the undergraduate population. Once male dominated, in the past 50 years four-year universities have seen great transformations in their male to female ratio. In 1960, there were 160 male students for every 100 female students in college. By 1980, there were just as many women enrolled as men. By 2003, there were 135 female students for every 100 male students graduating from a four-year institution. My research focuses on the gender imbalance on college campuses and its effects on the dating market. I hypothesize that the gender imbalance shifts the power in relationship formation to men and encourages women to engage in riskier behaviors in an effort to secure and maintain a relationship. Using data on campus arrest records and enrollment, I examine the relationship between college sex ratios and prevalence of alcohol violations and sexual assaults. Preliminary results indicate that a shortage of men significantly increases the rate of both sexual assaults and aggravated assaults. The effect of the sex ratio on alcohol violations is imprecise. My research emphasizes how behaviors and attitudes shift in an increasingly female-dominated environment and how this may affect future policy in education, public health, and beyond.

***Saccharomyces cerevisiae* as a Model System of Aβ Peptides Using a Copper Resistance Reporter**

Michael Cheng
Dr. Walter Schmidt, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Alzheimer's disease (AD) is a progressive neurodegenerative disorder primarily characterized by a decline in cognitive function caused by the damage and death of neurons and the loss of synapses in the brain. AD affects millions worldwide and currently has no cure, method of prevention, or effective treatment. The mechanism of the disease is not fully understood, but beta-amyloid (Aβ) peptides, specifically Aβ 1-42, are highly implicated as a causative agent of AD, due to their neurotoxicity and strong association with the disease. Currently, Aβ peptides are primarily studied through transgenic mice and Alzheimer's patients. The principal objective of this research is to create a cost-effective and efficient model system for the expression and evaluation of Aβ peptides using yeast (*S cerevisiae*). Because Aβ peptides are not toxic to yeast, a copper resistance reporter will be used. Aβ peptides 1-19, 1-28, 1-40, and 1-42 will be attached to an enzyme (CUP1) that mediates resistance in yeast to high concentrations of copper. The presence of Aβ 1-19 fused to CUP1 does not significantly interfere with the activity of the enzyme, and it is hypothesized that the subsequent Aβ peptide and CUP1 fusions will behave similarly. The proper function of CUP1 will serve as a marker for the presence of the Aβ peptides. If successful, this model system can be used as a tool for future studies of Aβ peptides, potentially leading to greater understanding of the mechanism of AD and the development of effective treatments for the disease.

Abstracts

Applying CRISPR-Cas Interference for Genomic Manipulation in *Streptococcus thermophilus*

Megan Chesne, CURO Honors Scholar, CURO Summer Fellow
Dr. Michael Terns, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Prokaryotes have adapted a versatile immune system called the CRISPR (Clustered, Regularly Interspaced, Short Palindromic, Repeat) -Cas (CRISPR associated) system to defend against invading nucleic acids of viruses or plasmids. CRISPR loci are composed of identical short repeat DNA sequences separated by variable spacer sequences that are identical to those found in invaders. When a microorganism is attacked by a phage, the CRISPR system selectively incorporates a segment of the invading DNA into the CRISPR array. The foreign DNA is then used as a template to generate CRISPR RNAs (crRNAs), which guide Cas protein complexes to disrupt the original invading sequence (interference). CRISPR-Cas systems have been applied for editing genomes of a variety of organisms. Previous research of *Streptococcus pneumoniae* and *Escherichia coli* indicate that crRNA and interference machinery can be designed to select for specific mutations. To create deletions, targeting plasmids and linear PCR deletion templates are introduced into cells. By selecting for the targeting plasmids, survivors will have undergone recombination, creating chromosomal deletions. Specifically, Cas2 in the CRISPR system 3 (Cas2-3) of *Streptococcus thermophilus* will be deleted as a pilot study to verify the feasibility of this technology. An artificial CRISPR plasmid targeting Cas2-3 and a PCR deletion template have been created, and transformation procedures are being optimized. Expansion of CRISPR guided genome editing into *Streptococcus thermophilus* will establish an efficient genetic approach to study CRIPSR-Cas and other processes in this important bacterium.

Polyadenylation in Stationary Phase *Escherichia coli:* Analysis of the Role of RNA Polymerase

Taylor Chishom, CURO Honors Scholar
Dr. Sidney Kushner, Genetics, Franklin College of Arts & Sciences

During exponential growth there are two enzymes in *E. coli*, poly(A) polymerase I (PAP I) and polynucleotide phosphorylase (PNPase) that can post-transcriptionally add extensions to the 3' termini of messenger RNAs (mRNAs). PAP I adds tails, primarily after Rho-independent transcription terminators, that consist entirely of A residues. These tails can range in length from 1-60 nucleotides. In contrast, PNPase adds tails, which contain all four nucleotides, at very different locations within the mRNAs. These tails can be anywhere from 20-500 nucleotides long. Previous work has shown that if both PAP I and PNPase are inactivated there are no detectable post-transcriptionally added tails in exponentially growing cells. However, when these cells enter stationary phase, which occurs under conditions of nutrient starvation, long poly(A) reappear. Since the structural genes for both PAP I and PNPase were deleted in such a strain, efforts have been made to identify the enzyme responsible for adding the poly(A) tails in stationary phase. Recent work has suggested that RNA polymerase, the enzyme that normally synthesizes RNA in the cell, is responsible for most if not all of the poly(A) tails seen in stationary phase cells. The process by which RNA polymerase could be adding the poly(A) tails is called transcriptional slippage. We have recently obtained a mutant in the b subunit (*rpoB*) of RNA polymerase that exhibits increased transcriptional slippage in *in vitro* experiments. My project involves cloning the mutationally altered *rpoB* gene into a low copy number plasmid to use in the further analysis of stationary polyadenylation. Subsequently, I will attempt to isolate mutants of *rpoB* gene that yield reduced levels of transcriptional

slippage. The long-term goal is to determine the biological importance of stationary phase polyadenylation.

Predicting Functional Independence with Impulsivity

Kirstie Chu
Dr. L. Stephen Miller, Psychology, Franklin College of Arts & Sciences

Finding a more accurate way to track functional independence is critical for early intervention among individuals who may require assisted living. Previous studies have shown a link between inhibition and functional independence in older adults, suggesting that impulsivity may serve as a predictor of functional ability. The study evaluated this hypothesis in a sample of 65 community-dwelling older adults (65-85 years old). Functional independence was assessed using the Direct Assessment of Functional Status (DAFS) to measure instrumental activities of daily living (IADLs). Impulsivity, a multidimensional construct, was assessed using the UPPS Impulsive Behavior Scale (UPPS), a self-report inventory evaluating four distinct facets of impulsivity (Urgency, Lack of Premeditation, Sensation Seeking, and Lack of Perseverance), and the Delis-Kaplan Executive Function System (D-KEFS) Color-Word Test. More specifically, impulsivity was operationalized as facet and total score on the UPPS Impulsive Behavior score and as scores on the inhibition and the inhibition/switching condition, as well as the error rates of the conditions, of the D-KEFS. Multiple regression analyses revealed that the inhibition condition task on the D-KEFS was the strongest predictor of IADLs, though the switching condition and its error rates were also significantly strong. While total UPPS score was not found to significantly predict IADLs, all but one of the facets of the UPPS, Lack of Perseverance, were able to predict IADLs, despite the unexpected directionality of Sensation Seeking and Lack of Premeditation. These findings suggest that certain aspects of impulsivity hold potential as markers of older adults' capacity to live independently.

Power Dynamics in Georgia's Poultry Industry, 1950-1965

Greyson Clark
Dr. Shane Hamilton, History, Franklin College of Arts & Sciences

The emergence of industrial-style poultry production, poultry agribusiness, between 1950 and 1965 in Georgia was a watershed period and encompassed a wide range of actors. Among the cast are government policy makers, government agents, national companies, individual farmers, agricultural specialists, technological innovators, and furnishing merchants. This project examines the relationships among these different actors with particular attention paid to the social power dynamics between government actors, small producers, and integrators. A significant portion of the historiography covering this period describes the economic establishment of the poultry industry as an agribusiness model. This project will build on the framework developed by studies of the development of the agribusiness model by focusing directly on the power dynamics between the actors within that emerging model, giving more attention to the relationships between different groups rather than retelling an account of the rise of agribusiness. To develop sound historical results, this project makes extensive use of primary source documents produced by government officials, businessmen, small producers, and others. The agribusiness poultry production which emerged in this period had ramifications beyond business model. The results of the study elaborate upon a generalized and often impersonal economic history, revealing sharp disparities of power and self-determination across different types of actors in the industrialization of poultry production. The

preponderance of evidence illustrates that small producers were disempowered and government actors were sidelined while integrators rose in prominence, concentrated decision-making power within their hands, and led the development of the new style of poultry production.

The Politicization of Soccer and the Effects of the 2014 World Cup on Brazilian Politics

Aaron Conley, CURO Honors Scholar
Dr. Barry Hollander, Journalism,
Grady College of Journalism & Mass Communication

The summer of 2014 will be extremely significant in terms of political and social issues in Brazil. Those actions will focus on a range of topics including public health and education, high tax rates, corruption, multi-billion dollar projects for the World Cup and Olympics, and social injustice for the poor in the *favelas* in major cities such as Sao Paulo and Rio de Janeiro. The catalyst for all of this comes in the form of the 2014 World Cup, hosted by Brazil, and played out in twelve major cities around the country. This research analyzes the political revolts that occurred during the 2013 Confederations Cup through media reports and public opinion polling. The uprisings staged during the tournament set a precedent that is all but assured to be upheld at the 2014 World Cup. The immediate future of Brazil will be entirely determined by the events that will unfold this year. The way that the World Cup changes the political nature of Brazil will have major ramifications on the 2014 presidential election, the 2016 Rio Olympics, and ultimately determine if Brazil will become the global power that some believe that it is capable of becoming. Politics and soccer are being combined in ways that have not been seen before, and this unique mixture will unfold on the world stage this summer. Held in this balance of politics and sport are the future of a nation, a continent, and ultimately the world.

Individual Differences in Cognitive Control: Antisaccade Performance in Those with Schizophrenia and Low Cognitive Control

Joseph Coppiano
Dr. Jennifer McDowell, Psychology, Franklin College of Arts & Sciences

Cognitive control is the ability to filter irrelevant information to make task-related responses. This can be measured with antisaccade tasks, where subjects fixate on a central target and are instructed to look at the mirror image location (opposite direction, same distance) when it jumps to the side. Performance is compared with prosaccade tasks, where subjects must look *toward* the target. Compared with healthy controls, those with schizophrenia (SZ) (a psychiatric disorder) make more errors and have slower reaction times (RTs) during antisaccades, but relatively preserved prosaccade performance, except for increases in express saccades (premature saccades made in 90-135ms). Neuroimaging studies based on these tasks using fMRI are abundant, but most compare SZ to those with high cognitive control (HCC), which could lead to discrepancies in brain activation due to differences in behavior rather than SZ-specific circuitry. We suggest using low cognitive control (LCC) individuals for comparison, given our hypothesis that their behavioral performance is more similar to SZ. Subjects (HCC=17, LCC=34, SZ=12) performed both pro- and anti-saccades while eyes were tracked and behavioral measures recorded. For antisaccades, the LCC group exhibited similar error rate and RTs as SZ, while HCC individuals exhibited lower error rate and faster RTs. Express saccades were more frequent in SZ and LCC than HCC. Results support our hypothesis that LCC individuals perform more similar behaviorally to SZ in

saccade tasks. This recruitment strategy is useful for neuroimaging studies, as it identifies a more comparable control group for SZ and may better inform fMRI study design.

Effect of Drying on Pulp Characteristics

Hannah Cornelia
Dr. José Reyes De Corcuera, Food Science & Technology, College of Agricultural & Environmental Sciences

Incorporation of more nutraceuticals such as phytosterols into the average US diet can have a positive impact in the overall health of our country. One of the main issues in incorporating phytosterols into foods is that they are water insoluble and poorly-to-moderately soluble in vegetable oils. The microstructure and hydrophobic nature of citrus pulp (juice vesicles) allows for absorption of compounds that are water insoluble. In addition, citrus pulp is one of the by-products of the citrus juice industry with greatest market increase as it can be used to impart to beverages a mouth-feel and flavor that is perceived by consumers as "natural" and "fresh". Processing citrus pulp requires separation from the pulpy juice, pasteurization, and usually storage frozen. Pulp can also be dried. However, drying affects the microstructure of the pulp. We hypothesize that the method of drying impacts the oil-holding capacity of dried citrus pulp. The overall objective of this research project was to maximize the amount of oil that can be absorbed by citrus pulp, thus maximizing the amount of oil-soluble nutraceuticals that can be incorporated into a pulpy fruit beverage. Three drying methods were examined in this research project–drum drying, tray drying, and freeze drying–to determine the best way to process the pulp to maximize the amount of phytosterol-rich oils absorbed by the pulp. Our preliminary results indicate the drum dried pulp is able to absorb more oil compared to the freeze dried pulp. After three trials, I found that the drum dried pulp on average was able to absorb 24.49 % soybean oil (grams oil/ gram pulp) and the freeze dried pulp was able to absorb on average 19.66 % of oil.

Ta-Tas or Not: The Needs of Female Breast Cancer Survivors Will Not Be Forgotten

Mallory Cox
Dr. Katalin Medvedev, Textiles, Merchandising & Interiors, College of Family & Consumer Sciences

After battling breast cancer, many women undergo a mastectomy procedure in which one or two of their breasts are removed to get rid of the cancerous tumor. After their operations, breast cancer survivors have difficulty finding clothing that fits their new body comfortably and allows them to feel "normal" again. Because of this, a niche market has developed to accommodate the physical changes female breast cancer survivors have endured. Several department stores and specialty boutiques are catering to breast cancer survivors by supplying garments that meet the specific needs of these consumers. *Nordstrom* has a prosthesis program offering post-mastectomy bras with pockets for the prosthesis, while specialty boutiques such as *Wear Ease* and the *Alloro Collection* offer garments such as post-surgical camisoles with fiber-filled breast forms to imitate real breasts, compression garments that help with swelling caused by lymphedema, and dolman sleeves that make it easy to put on and take off a garment. Through my research, I found that specialty garments significantly increase the quality of life of cancer survivors because they allow them to find a renewed sense of identity. The clothing items created for breast cancer survivors provide a number of functional benefits; they allow for comfort and ease. However, the positive psychological impact that these clothes have on female breast cancer survivors surpasses the functional benefits because they help them accept their

new body, complete the healing process, and get on with their lives.

The Evolution and Tradeoffs of Physical and Chemical Leaf Defenses in *Helianthus*

Breanna Crowell
Dr. Lisa Donovan, Plant Biology, Franklin College of Arts & Sciences

Plant defenses are a result of adaptations to biotic and abiotic factors. Plant defenses can be either physical or chemical and act in a number of ways to prevent herbivory. Because organisms are ultimately limited by resource availability, plants have been seen to balance resource allocation to defenses, growth, reproduction, and other functions in response to their particular environment. These strategies vary across species and populations and are described by the concept of the worldwide leaf economics spectrum. In part, this concept hypothesizes that plants with short leaf lifespans and high leaf nutrient concentrations will invest less in defense while plants with long leaf lifespans and low leaf nutrient concentrations will invest more in defense. Studies have been done to investigate if tradeoffs between chemical and physical defenses and growth exist across multiple taxonomies and geographies. While no evidence was found for syndromes of defense or latitudinal gradients in defense across broad collections of plant families, it has been proposed that these tradeoffs could exist at lower levels of organization like the genus level. This study uses a phylogenetic comparative study of leaf defenses across wild sunflowers (the genus *Helianthus*) to investigate evolutionary tradeoffs between physical and chemical defenses, latitudinal gradients in defenses, and the relationship between leaf defenses and the leaf economics spectrum. Traits under study include trichome density, tannin activity, leaf lipid content, and leaf ash content. Preliminary trichome and tannin data has shown variance in levels of these defenses across 84 populations of 28 species across *Helianthus*.

Modeling the Biological Clock in *Neurospora crassa*

Sarah Cunningham
Dr. Jonathan Arnold, Genetics, Franklin College of Arts & Sciences

The genome of *Neurospora crassa* contains several genes that create a closed loop network describing the function of the biological clock. The dynamic concentrations of the genes *white collar-1*, *white collar-2*, *frequency*, *vivid*, and *clock controlled genes* and their RNA and protein products in this network regulate cell growth. Several models of the clock have been suggested that include more interactions and differentiate between reactions of proteins that occur in the cytoplasm versus the nucleus. Using computer simulations and ensemble runs to test for fit to available data, the fit of each network is determined. The best network was identified and the effectiveness of other networks (previously published and otherwise) was compared. The network identified as having the best fit can now be used to gain insight into mechanisms underlying circadian rhythms in Neurospora, such as aging and metabolism, and the structure of genetic networks in general.

On a Lack of Identifying Obstructive Sleep Apnea

Tyler Daugherty
Dr. Tho Nguyen, Physics & Astronomy, Franklin College of Arts & Sciences

Obstructive Sleep Apnea (OSA) is a disorder "in which the flow of air pauses or decreases during breathing" while an individual is asleep "because the airway has become narrowed, blocked, or floppy." It afflicts a large percentage of the adult population but is most associated with the obese. OSA's mistaken exclusive association with obesity leads to a

paucity of diagnosis—only 10% of those affected are diagnosed. Undiagnosed sleep apnea is a major risk factor for Alzheimer's disease, stroke, high blood pressure, hypertension, insomnia, diabetes, cardiovascular disease, and many others. It also doubles an individual's likelihood of being involved in an automotive accident. Recognizing that approximately 56.5 million people in the U.S., 18% of the population, are undiagnosed sleep apneics, a substantial portion of society has a considerably increased likelihood of being burdened with the personal health *and* monetary costs of contracting these disorders. Additionally, societal costs to under-diagnosing this disorder are manifold and include loss of productivity and increased healthcare costs. But, through the use of a national awareness campaign and health care procedural reform, the effects and even the presence of this detrimental affliction can be significantly reduced, improving the quality of life of a large section of the population.

The Effects of Centralization on Performance When Moderated by Diversity

Amber Davidson, Seyi Amosu, Brennen Clift, Sam Craig, Kyle Ledesma
Dr. Karl Kuhnert, Psychology, Franklin College of Arts & Sciences

We were interested in using network analysis to study centralization's impact on performance when moderated by diversity. In order to explore such team dynamics, data was collected from the National Basketball Association. 800 total games played by 30 different teams were recorded from the website www.basketball-reference.com. Our diversity variable was the relationship between tenure (time with that particular team) and centrality of the team. We believe social identity theory will decrease any of the negative effects of diversity on performance because people will be associating less with their individual diversity and be focusing more on their identity as an organizational team. We hypothesize that centralization will have a significant impact on performance, specifically when moderated by diversity. Centralization measures were calculated by assembling matrices for each of the 800 games and calculating overall centralization, indegree centralization, and outdegree centralization using the assist link patterns. Finally, our dependent variable of team performance is measured by "true shooting percentage," a measure of shooting efficiency that takes into account field goals, 3-point field goals, and free throws. The main effect model results indicate a nonsignificant model fit ($F(1,798)= 1.589$, NS) and nonsignificant beta weights for Centralization as a predictor of Performance ($\beta= .045$, NS); thus, the main effect was not supported. The interaction effect was examined by comparing the R2 between the two models and testing whether the change in R2 value was significant. Results of the comparison indicate that $\Delta R2 = .011$, which was significant ($p<.05$). Further, beta weights for the interaction term ($\beta= -.024$, $p <.05$) were also significant. Thus, our interaction hypothesis was supported. Overall, our results provide support for the idea that diversity of tenure can moderate the effect of team centralization on team performance.

Social Skills as Protective Factors against Poor Attitudes towards Having Tourette Syndrome in Children

Amy Davis, Kelsie Flanigan
Dr. Ronald Blount, Psychology, Franklin College of Arts & Sciences

Children with Tourette syndrome (TS) are more likely to have poor social relationships than healthy peers. Social skills deficits may be related to children's attitudes towards living with TS. The current study aimed to examine social skills as potential protective factors that may support better attitudes toward living with TS. This study is important because the

relationship between social skills and attitudes has not been investigated and may be a target of intervention to support better attitudes towards having TS. Participants included 28 parents and 32 children with TS who completed questionnaires before attending a camp for children with TS. Children reported attitudes regarding their diagnosis with TS on the Child Attitude Toward Illness Scale (CATIS). Child self-reports and parent-proxy reports were obtained from the Social Skills scale of a camp growth measure, which included the following subscales: Making Friends, Insecurity, and Peer Relationships. Bivariate correlations showed statistically significant relationships between the CATIS and child self-reports on the Social Skills subscales, with medium to large effect sizes. There was a statistically significant relationship between the CATIS and parent report on the Insecurity and Peer Relationships subscales with large effect sizes; the Making Friends subscale was not significant. Results indicated that higher social skills might be protective factors against developing poor attitudes toward living with TS. Social skills interventions could benefit this population by supporting social competence, and therefore improve children's adjustment to having TS.

Evolution of Flowering Time and Disc Color across the Genus *Helianthus*

Kaleigh Davis
Dr. Lisa Donovan, Plant Biology, Franklin College of Arts & Sciences

This research explores the effects of various environmental factors on flowering time evolution across the genus *Helianthus*, as well as the role flowering time and disc color might play as an evolutionary mechanism for sympatric speciation. Previous research in *Helianthus* has proposed two potential paths for the evolution of dark discs from light, and demonstrated a positive correlation between flowering time and latitude. Since this research, a second common garden including additional *Helianthus* species has generated a data set of multiple populations for 28 species. This has allowed for robust phylogenetic analysis of both flowering time and disc color evolution that will be used to test relationships between flowering time and temperature seasonality, frost and drought risk, soil fertility, and life history. Species and populations from more seasonal habitats and habitats with high risk of drought and frost are hypothesized to flower earlier, while species and populations from more fertile habitats are hypothesized to flower later. It is hypothesized that annuals will flower earlier than perennials due to the evolutionary risks involved in monocarpy. Furthermore, it is hypothesized that sympatric sister species will exhibit larger differences in flowering time than allopatric sister species, due to the process of reinforcement. This research expands our understanding of the ecological and evolutionary responses of flowering time, which will allow for improved prediction of species persistence and displacement under global climate change.

Perceptions about Global Development

Alexa DeAntonio
Dr. Maria Navarro, Agricultural Leadership, Education & Communication, College of Agricultural & Environmental Sciences

The conflict in the Democratic Republic of Congo is the deadliest conflict since World War II, and it is ongoing. Why, then, does the general public seem not to know or care much about this issue? This research analyzes the public's awareness, knowledge, and attitudes about the developing world, and the role that the media has (or has not) played in shaping these perceptions. A content analysis of online news articles assesses the coverage of the developing world with a focus on Africa and the Americas. Interviews will provide insight into individuals' knowledge and opinions about development in these regions.

The interviews will also be used to determine from where research participants receive their information and how their perceptions about development have been shaped. Thus far, results indicate that in the time frame analyzed, the media presents an ongoing theme of violence as it relates to the developing world, but news on development, itself, is extremely limited. Overall, the research will examine the differences between participants in levels of awareness, knowledge, and attitudes about global development and the developing world, and the reasons behind these differences, with a special focus on the sources of information and news coverage.

Students' Perceptions of the Police – An Analysis of Greek and Non-Greek Affiliated Students

Lindsay DeFrancesco
Dr. Natasha Ganem, Sociology, Franklin College of Arts & Sciences

This study investigates students' perceptions of the police in college towns. A survey was taken of 214 University of Georgia students who answered a series of statements intended to reflect their attitudes towards police in the area. This study is unique in that it broke down the sample of responses between students who are members of the University's Greek system and students who are not. The analysis also measured alcohol consumption amongst respondents to determine if drinking habits were correlated with Greek and non-Greek students' attitudes towards the police. It was found that Greek perceptions of the police were overwhelmingly negative and also significantly worse than students who were not members of a Greek organization. Frequent drinking habits did not have an effect on Greek perceptions of the police but did have a negative effect on non-Greek members' attitudes towards the police in that weekly drinkers' perceptions were worse than monthly drinkers.

Intron Loss in the ABCB1 Gene

Victoria DeLeo, Ramsey Scholar
Prof. Katrien Devos, Crop & Soil Sciences, College of Agricultural & Environmental Sciences

The *ABCB1* gene encodes an auxin transporter protein, knockouts of which cause an economically important dwarfing phenotype. The gene shows remarkable intron number variance, particularly among the *Poaceae*, from the ancestral state of nine introns, found in dicots, to as few as two, found in rice and millet. The mechanism by which intron loss occurs is not well understood, so we sought to identify patterns of loss and characteristics of this particular gene that may explain the frequency of the intron loss. Previously, we acquired and aligned sequences for *ABCB1* homologs in plant species for which sequence data was available. For non-sequenced species, we designed primers near intron/ exon boundaries to amplify across introns and determine, based on fragment size, intron presence. Based on this data, introns 1, 2, 5, and 6 were lost independently in various lineages, and introns 1, 3, 4, 8, and 9 were lost together after the divergence of grasses. To validate the results of our PCR analyses, the entire *ABCB1* gene from representative species has been cloned into *E. coli* for sequencing. In addition to tracking intron loss events, we are investigating whether the most widely conserved intron, 7, was retained for functional reasons. We are transforming an *ABCB1*/*ABCB19* Arabidopsis mutant which lacks both *ABCB1* and its functionally redundant homolog *ABCB19* with a copy of *ABCB1* from which intron 7 has been removed to see whether and how phenotype restoration is affected. Finally, we compare *ABCB1* to other genes showing high frequencies of recurrent intron loss.

Abstracts

Determining the Role of FhlA in Transcriptional Activation of Newly Identified RpoN Dependent Promoters

Anquilla Deleveaux
Dr. Anna Karls, Microbiology, Franklin College of Arts & Sciences

In our characterization of the RpoN regulon of *Salmonella* Typhimurium, 278 RpoN binding sites were identified. One of the sites is located in the 5' untranslated region of a hydrogenase two operon where it overlaps a RpoD promoter. When the RpoD promoter is activated, genes *hybC, hybB* and *hypO* are transcribed. With the activation of the RpoN promoter, its orientation is antisense of the RpoD promoter; therefore, it activates genes in the opposite direction while blocking the RpoD promoter from transcribing the *hypO* operon. Characterizing the RpoN regulon involves analyzing active bacterial enhancer binding proteins required to activate transcription at RpoN dependent promoters. A constitutive activator, DctD250, initially was used to activate the RpoN promoter; however, distinct bEBP's and environmental factors will be examined to investigate what cells use naturally to activate this promoter. A specific activator known as FhlA may serve as the activator to bind near this promoter to activate its genes. FhlA controls transcription of operons that include hydrogenase maturation genes, formate hydrogen lyase, and formate dehydrogenase which are similar to the hydrogenase operon. Our hypothesis is that FhlA will bind near the RpoN promoter in the presence of the right environmental stimulus. FhlA will be cloned into a high copy plasmid, pTrcHisC, which contains a His-tag for protein purification for the isolation of FhlA. DNA binding assays will test if protein FhlA will bind upstream of the promoter. This will be the first indicator of whether FhlA is the correct activator.

Mechanism of Mammalian Resistance to Trypanosome Lytic Factor

Lauren Dennison, Foundation Fellow
Dr. Stephen Hajduk, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

African sleeping sickness is a vector-borne parasitic disease that is the result of infection by certain subspecies of African Trypanosomes. One subspecies, *Trypanosoma brucei brucei*, is non-lethal to humans due to the innate immune molecule Trypanosome Lytic Factor (TLF). TLF contains the apolipoproteins characteristic of HDL (Apolipoprotein A-1) but also contains two additional proteins unique to higher primates, haptoglobin related protein (Hpr) and apolipoprotein L-I (APOL1). Upon binding of free hemoglobin to Hpr, TLF is able to bind to an HpHb receptor expressed exclusively in trypanosomes. Once bound to the receptor, TLF is endocytosed and trafficked to the lysosome where it initiates lysosomal breakdown, resulting in cell lysis. After observing the interactions of TLF and African trypanosomes, we were led to question what mechanisms are in place to protect the mammalian system from the toxic effects of TLF. Here we confirm HEK resistance to TLF using concentrations of TLF thousands of times greater than that required to kills trypanosomes. Using imaging flow-cytometry, we found that TLF was indeed taken up by mammalian cells and localized to lysosomes. Contrary to trypanosomes however, the mechanism of uptake in mammalian cells is not dependent on hemoglobin. Additional studies to address the possibility that physiological concentrations of TLF-1 (around 10μg/ml) are simply insufficient to produce the phenotype found in *T. b. brucei* will be carried out. Once the mechanism of resistance is better understood, it is possible that certain cells, such as tumor cells, may be made susceptible to this natural toxin.

Abstracts

Towards a Dynamical Model of Language Processing

Jonathan Dickens
Dr. Bill Kretzschmar, English, Franklin College of Arts & Sciences

A central assumption in contemporary linguistics is that language is a cognitive system, or a structured object seated in the brain that consists of rule-governed units. The result of this view has been the instantiation of grammar as a biological object in linguistic theory, and linguistics now faces the challenge of being reconciled with cognitive neuroscience. Evidence from linguistic surveys and corpora shows that rather than being a hierarchical system of fixed relations, language is a dynamical system, or an emergent phenomenon that arises from the continuous interactions between speakers and their environment. In this paper, I examine generative and cognitive approaches to linguistics in conjunction with Edelman's (1987) selectional model of brain function and Pulvermüller's (2002) neuronal grammar in order to motivate the rejection of grammar as a neurocognitive object. Specifically, I argue that the reification of linguistic structure fails to take into account the dynamical and embodied nature of language such that it precludes the development of a model that integrates language behavior and cognitive neuroscience. Furthermore, evaluation of symbolic and connectionist models of information processing against neuroscientific considerations demonstrates that the computational and modular theories of mind as espoused by Fodor (1983) and generative models fail as modes for characterizing the language-brain interface. I propose that dynamical modeling and neuronal group selection should instead serve as the basis for a neurocognitive theory of language processing. Adopting a dynamical framework grounded in neuroscience has significant implications regarding how models conceive mental representation and grammar.

Grace Kelly: Femininity in Film

Molly Dodd
Dr. Patricia Hunt-Hurst, Textiles, Merchandising & Interiors, College of Family & Consumer Sciences

Females have always faced the stigma of adhering to evolving ideas of femininity, or characteristics of "acting feminine." American feminist Susan Brownmiller defines femininity as "a romantic sentiment, a nostalgic tradition imposed of limitations" (1984, p. 14). She continues to delineate that women instinctively act upon these societal constraints to avoid the risk of losing one's sexual identification as a woman. Ideas towards femininity continually alter to meet social demand. In this paper, I present ideas of femininity and how Grace Kelly's costumes, in conjunction with her character's actions, expressed femininity in two of Alfred Hitchcock's films: *Rear Window*, 1954 and *To Catch a Thief,* 1955. Additionally, I will compare silhouettes as seen in Grace Kelly's films to popular fashions of her contemporary time, including variations of Dior's New Look, correlating her representations of femininity through the work of costume designer Edith Head. Grace Kelly was considered one of the leading actresses of her time, known for her beauty and analytical mind. The 1950s is generally regarded as a time period of conservative dress and attitude. A definition of femininity evolved that centered on domesticity and dress (Dunar, 2006, p. 590). How dress is reflected in the movies gives 21st century viewers an understanding of historical evolution of how women dressed and how dress represents the zeitgeist of a time period.

Abstracts

Octopaminergic Gene Expression and Flexible Social Behavior in the Subsocial Burying Beetle *Nicrophorus vespilloides*

Mary Douthit, CURO Summer Fellow
Dr. Allen Moore, Genetics, Franklin College of Arts & Sciences

Flexible behavior allows organisms to respond appropriately to changing resources and social conditions. Behavioral flexibility plays a major role in successful breeding for the beetle, *Nicrophorus vespilloides*, which exhibits highly developed parental care. Adults are socially tolerant when mating, express aggression when defending reproductive resources, and return to social tolerance when parenting. Previous works link octopamine, a molecule that acts as a neurotransmitter and neurohormone, to aggression in insects. Based on this association, we hypothesized that genes directly involved in the octopaminergic system would be differentially expressed across different social and reproductive environments important to *N. vespilloides'* life history. Following PCR verification of eight genes in the octopaminergic system, we used qRT-PCR to compare relative expression of the eight genes from virgin females, mated females, mated females on a resource required for reproduction, and mated females on a resource with a male. Contrary to our predictions, we found neither enzyme gene changed expression levels, while many of the receptor genes did. The expression of octβr1 and octβr2 was relatively higher in mated females. octαr and tyrr1 gene expression was relatively lower in mated females with a reproductive resource and a male. Considering these results along with studies on other insects, we suggest each receptor might uniquely influence *N. vespilloides*' social behaviors. We also suggest that in *N. vespilloides* the octopaminergic system is associated with resource defense, alternative mating tactics, social tolerance, and indirect parental care.

Measuring Brain Tissue Factor Levels in Malaria Infection

Allison Doyle, CURO Summer Fellow
Dr. Julie Moore, Infectious Diseases, College of Veterinary Medicine

Malaria remains a highly prevalent disease in many regions and accounts for at least 1 million deaths every year. While several theories exist to explain the disease in humans, the mechanisms of malaria pathogenesis remain incompletely understood. Infection by *Plasmodium falciparum* has been shown to be associated with increased levels of markers of coagulation and fibrinolysis in placental malaria and cerebral malaria patients, suggesting that increased blood coagulation activation occurs in malaria pathogenesis. Although coagulation activation is known to occur in malaria, its precise role in pathogenesis is still being elucidated. In coagulation-based models of pathogenesis, the protein tissue factor (TF) is of great interest, as it is an important interface between a host's immune response and coagulation processes. Assays were performed utilizing a hemostasis analyzer to measure TF activity levels in organs of mice infected separately with *P. chabaudi* and *P. berghei*. Results demonstrate increased levels of TF activation in the lung tissue of infected mice relative to uninfected controls, as expected. However, in the brain, an unexplained trend in TF activity levels was observed: uninfected samples and samples from *P. chabaudi*-infected mice showed approximately equal levels of TF activity, but samples from *P. berghei*-infected mice showed substantially less activity. Determining whether these variations in TF levels resulted from the assay or underlying physiological mechanisms is the objective of this study. Several aspects of the assay will be altered and tested: (1) the amount of brain tissue in each sample; (2) if utilizing different regions of the brain in samples affects observed TF activity levels; (3) if lipid separation in tissue samples

after homogenization affects the observed TF levels.

Bridging the Gap: The History of British Science Examined through Literature
Justin Dumrongkulraksa, CURO Honors Scholar
Dr. Elizabeth Kraft, English, Franklin College of Arts & Sciences

Science and technology have evolved considerably since the Restoration of Charles II, and these changes have been etched in the literary history of the United Kingdom. This paper will be tracing the general shifts in British public perception toward science and technology from the Restoration era to the present with focus on the mid-nineteenth-century clash between science and religion concerning Charles Darwin's *On the Origin of Species*. With the advent of the Royal Society in 1660, prominent scholars such as Isaac Newton and Joseph Priestly engaged in scientific discourse with public support throughout the eighteenth century. It was not until Romanticism in conjunction with Industrialization that public opinion began to turn to the negatives of technology, pondering the costs of recklessly pursuing scientific inquiry without regard for nature or the common man. Technology such as the camera also incorporated the public into war, exposing people to the horrors science can bring to the human body on the battlefield such as in Crimea. To this day, the popular topic of discourse concerns the future of science and society and how the two will eventually integrate given the rate of discoveries. Questions such as the future of culture, nationhood, and human interaction are widespread, with people divided as to whether technology will be our transcendence or damnation. Understanding the form technology has assumed in the past will help bridge the gap between scientist and public that has been fueled with over three centuries of distrust and exploitation.

Capital-Intensive Punishment: Reducing the High Costs of Federal Drug Incarceration
Alexandra Edquist, Foundation Fellow
Dr. David Mustard, Economics, Terry College of Business

The federal government spent roughly $3.7 billion in 2013 incarcerating drug offenders, but the government reaped little in benefit from this extraordinary expense. The massive increase in drug incarceration from 1980 until today has only slightly decreased the crime rate, and at current levels of incarceration, incarcerating additional drug offenders actually increases the crime rate because they crowd out violent and property offenders, who must be released early to make room in prisons for drug offenders with mandatory minimum sentences, and those violent and property offenders are more likely to re-offend. Furthermore, current policy does little to address high recidivism rates and therefore future crime. This research did cost-benefit analyses on different ideas proposed to reform drug incarceration to find which would be the most effective way of closing the current cost-benefit gap. The research found that adding proven rehabilitation programs, such as vocational training and drug treatment, would increase the overall costs of incarceration but make incarceration more cost-efficient by reducing future crime. Removing mandatory minimums was the second-most effective of the methods studied at making drug incarceration more cost-efficient.

Enzymatic Assay of DHPS Degradation in Abundant Marine Alphaproteobacteria
Blake Edwards
Dr. Mary Ann Moran, Marine Sciences, Franklin College of Arts & Sciences

Patterns of gene expression in members of a bacterial-diatom model system between *Ruegeria pomeroyi* DSS-3, a member of the

alphaproteobacterial Roseobacter clade, and *Thalassiosira pseudonana*, a cosmopolitan diatom, indicate that the novel sulfonate compound 2,3-dihydroxypropane-1-sulfoante (DHPS) serves as a key carbon and sulfur source for bacteria when in co-culture with diatoms. This compound has never been described in ocean organosulfur cycling and may represent gaps in our reconstruction of marine carbon and sulfur models. With enzymatic data for homologous dehydrogenases found in *R. pomeroyi* DSS-3, a "calibration curve" can be created to help identify which other marine bacterial taxa harbor dehydrogenases that are active in DHPS degradation. Specifically, the orthologous proteins in the alphaproteobacterial clades SAR116 and SAR11 will be examined since these are two very abundant and ecologically important groups of marine bacteria, like the Roseobacter clade. With purified protein extracts from *R. pomeroyi* DSS-3 of the verified DHPS dehydrogenase, HpsN, and the paralog histidinol dehydrogenase, HisD, as positive and negative controls, respectively, enzyme activity for other "HpsN-like" dehydrogenases will be photometrically tested with DHPS through the production of NADH+. Taxonomic identification of HpsN activity across important marine alphaproteobacterial taxa will lend valuable insight into which members of the bacterioplankton community drive sulfonate cycling in the ocean and ultimately determine the fate of sulfonate-derived carbon and sulfur. Characterization of DHPS degradation will further help to determine its role in primary and secondary production and its impact on major biochemical transformations in the ocean.

The Preliminary Investigation of Whether Switchgrass SND1 Orthologs Can Activate the Secondary Wall Biosynthesis

Janefrances Egbosiuba, CURO Summer Fellow
Dr. Zheng-Hua Ye, Plant Biology, Franklin College of Arts & Sciences

In plants, there are two types of cell walls that are formed: primary and secondary cell walls. Primary cell walls provide mechanical strength for the cell as it grows and divides. Secondary cell walls are produced once the cell has ceased to grow. For plants secondary cell walls help produce strong xylem, which is used to transport water and minerals from the roots to the remaining parts of the plant. The secondary cell walls also offer strong rigid structure, which allows trees and other woody plants to stand tall for many years. Secondary cell walls serve a very important role for human life because they are huge components for woods and other products such as paper, musical instruments and many others (Zhong and Ye, 2009). Secondary cell walls in wood and fibers are also important renewable source of biofuels; therefore, this could reduce our dependency on other resources such as petroleum. My research focuses on the transcriptional regulation of secondary cell wall production in biofuel crop plants. Transcription factors control the activation of genes in the genome. The transcription factor binds to DNA and other proteins, in order to turn genes off or on. Transcription factors work by recognizing certain nucleotide sequences in the promoter region of the gene on the chromosome. The transcription factor that this research will be focusing on is SND1. This particular transcription factor is known to activate the biosynthesis of the secondary wall and particularly the secondary wall biosynthesis of Arabidopsis. We will be investigating whether switchgrass SND1 orthologs can activate the secondary wall biosynthetic program, as does Arabidopsis SND1. Switchgrass, also known

as *Panicum virgatum*, is a warm-season tall grass found in North America. It is very versatile and adaptable. Today, it is mostly used to control erosion. Switchgrass is also known to provide excellent habitat for wildlife. Research has proven that switchgrass is a good renewable bioenergy crop because of its ability to produce high yields on marginal farmlands. Benefits such as stand longevity, drought and flooding resistance, and relatively low herbicide and fertilizer input requirements are some of the many advantages of producing switchgrass. Using various scientific techniques, we investigated whether switchgrass SND1 orthologs play a role in the biosynthesis of secondary wall biosynthesis. This research project involved the use of the GenBank database to identify switchgrass transcription factor genes that show close sequence homology to the Arabidopsis SND1 gene. The PCR was used to amplify the swtichgrass transcription factor cDNA, which was engineered between the CaMV 35S promoter and a terminator in an expression vector. The engineered genes were transferred into Arabidopsis protoplasts to test their ability for activation of secondary wall biosynthesis genes. Our results showed that switchgrass SND1 genes were able to activate secondary wall biosynthetic genes, indicating that they might function as transcriptional switches controlling biomass (secondary walls) production in switchgrass.

Addressing Inequality in Early Childhood Executive Function Development

Megan Ernst, Foundation Fellow
Dr. Janna Dresden, Elementary & Social Studies Education, College of Education

This paper will demonstrate how addressing executive function in early childhood for low-income students can positively affect the achievement gap in Athens-Clarke County, Georgia. This gap is evident by the time a child enters school and only grows as children progress, indicating that school readiness is a primary factor in the sustained disadvantage of low-income students. While this reflects delays in the acquisition of academic knowledge, it also reflects delays in cognitive development, primarily executive function, the cognitive skills that support academic success. Executive function develops rapidly between birth and age six, and continues to significantly develop throughout the elementary years as well. Proper executive function plays a central role in early academic and social-behavior readiness. Through the analysis of current research and community need, and after evaluating three alternatives and the status quo against measures of equality, cost-effectiveness, and feasibility, this paper recommends an expansion of elementary school teacher education in cognitive development and its role in the connection between the classroom and home life. This paper suggests modifying the county's Comprehensive School Improvement Plan to require that 50 percent of professional training required for recertification consist of curriculum in executive function and family engagement. Long-term, this paper suggests a collaborative partnership between the local government, the school district, the state department of education, the University of Georgia, and local nonprofits to provide a home-visit program to all families below 133 percent of the federal poverty level with children through first grade.

Uncovering the Heritage of Slavery at the Shields Ethridge Farm: Memory, Identity, and Heritage Tourism

Seth Euster, Foundation Fellow, CURO Summer Fellow
Dr. Christopher Lawton, History, Franklin College of Arts & Sciences

On the morning of November 20th 1799, Joseph Roberts Shields rode towards the slave market in Lewisville, Georgia. There, he purchased two slaves, Leah and her infant

child Sophia, from the slave trader Willis Gunnels. For Shields this was a morning that marked his first investment in human chattel, a step towards agricultural success in the Georgia upcountry. For Leah and Sophia it was a morning that shaped the courses of their lives and the lives of their descendants into the 21st century. Shields's farm prospered and he and his descendants became some of the wealthiest and most powerful men in Jackson County. The number of people enslaved by the family continued to grow, as well. Yet, at the end of the Civil War, some 66 years after she and her mother were purchased, when she was the eldest of nearly 20 slaves on the place, Sophia marked an "X" by her name on a contract defining the terms of her emancipation. She and generations of her decedents lived and worked on and nearby the farm into the 1960s. Building on recent historiography, this project is an attempt to understand slavery through the lens of those who were enslaved. Drawing on a rich archive of primary documents, most still held at the Shields-Ethridge Farm, this project both reconstructs the biographies of the slaves who served the Shields family and conducts a historiographical analysis of their community. The content has been incorporated into a digital documentary for the Georgia Virtual History Project, which, when viewed on-site, can better help visitors understand the farm's rich, complex, and truly multicultural past.

Salmonella enterica and *Escherichia coli* Can Exploit Diverse Pathways to Form Vitamin B1 in the Cell

Kristen Farley
Dr. Diana Downs, Microbiology, Franklin College of Arts & Sciences

Phosphoribosyl amine (PRA) is an essential intermediate for both thiamine (vitamin B1) and purine biosynthesis in *Salmonella enterica*. PRA is synthesized by the enzyme phosphoribosylpyrophosphate amidotransferase (PurF). A null mutation in the gene encoding PurF causes the cell to have both a purine auxotrophy and a conditional thiamine auxotrophy. It has been shown that increased flux through the oxidative pentose phosphate pathway can allow PRA formation that is sufficient for thiamine-independent growth in a *purF* mutant. In a *purF gnd* mutant, flux through the oxidative pentose phosphate pathway is disturbed and thiamine-independent growth is eliminated. Suppressor mutation analysis of a *Salmonella purF gnd* strain has uncovered suppressor mutations in various genes which restore PRA formation and growth without thiamine. Due to the vast genetic similarity between *S. enterica* and *E. coli*, this study will probe the alternative PRA forming pathways in *Escherichia coli* to test the hypothesis that PurF-independent thiamine synthesis (PRA formation) is conserved in these two model systems. Preliminary data has shown that in *E. coli* i) a *purF* mutant is a thiamine prototroph, ii) a *purF gnd* mutant maintains modest thiamine-independent growth (i.e. PRA formation), and iii) at least three alternative PRA forming pathways are conserved. An in-depth suppressor mutation analysis of *S. enterica* and *E. coli purF gnd* mutants will identify the similarities and differences in their metabolic networks surrounding thiamine biosynthesis.

Investigating Female Remating Rates in Wild *Drosophila neotestacea* and Their Association with Sex-Ratio Drive

Emily Fawcett, CURO Summer Fellow, CURO Graduation Distinction
Dr. Kelly Dyer, Genetics, Franklin College of Arts & Sciences

Selfish genetic elements (SGEs) are portions of DNA that increase rates of their own transmission even if harmful to the host. Sex ratio (SR) drive is a specific type of SGE found on the X chromosome that acts in males to destroy Y-bearing sperm and can

ultimately have grave effects on populations. The frequency of SR in wild populations of *Drosophila neotestacea* varies from 0 to 30%, although the exact cause for this variation is unknown. One proposed method for the maintenance of SR in wild populations is polyandry, or multiple mating by females, because it allows for increased sperm competition, which may affect SR males more than non-SR males because of their reduced sperm count. In this study, I explore the levels of female mating rates in wild *Drosophila neotestacea* to determine if a relationship exists between mating rates and SR levels in the wild using flies collected from two time points in the Great Smoky Mountains. I also examine number of offspring produced by wild-collected males to determine if SR males actually produce fewer offspring than do normal males. I found no evidence for a relationship between levels of polyandry and SR prevalence in the wild, nor for decreased numbers of offspring sired by SR males compared to normal males. However, we plan to update our methods to test these hypotheses once more.

The Evolution of the Little Black Dress

Anne Fernandes
Dr. Patricia Hunt-Hurst, Textiles, Merchandising & Interiors, College of Family & Consumer Sciences

The little black dress is an iconic piece of women's clothing with a long history. Its everlasting popularity has come from the fact that it is a "cultural lexicon" (Smith 5). People know what you are referring to when you say little black dress: effortlessly chic, while still showing that a woman has style and taste. It is versatile, sophisticated, practical, and even sexy. To prove just how timeless the little black dress is, I researched books and *New York Times* articles dating back from 1921 to 2009. First in 1921, the *New York Times* reported that women had adopted "all-black costumes with lilac chapeaux," which Paul Poiret, a famous designer at the time, called the women's uniform ("Paris Women Wear Black," Jun 11, 1921, p. 7). Later in 1984, Paula Deitz wrote about an exhibit of little black dresses from the past. She said what was "immediately striking about the display of 21 dresses from the English and French couture is that any one of them could walk out to a real cocktail party today and look as fresh and classic as the day it was designed" (Deitz, Mar 4, 1984, p. 188). Through newspaper articles, I found a great deal of information about how the little black dress has transformed over time and why it has remained a staple in women's wardrobes. Despite the many changes the little black dress has gone through, it has always remained a classic and important piece of women's clothing.

Single-Case Research Designs to Evaluate Social Behavior Development of Children with Autism Spectrum Disorders

Allison Fialkowski, CURO Honors Scholar
Dr. David Gast, Communication Sciences & Special Education, College of Education

The autism spectrum disorder (ASD) affects an estimated one in eighty-eight children, and the numbers of diagnoses have been rising drastically since autism was first added to the third edition of Diagnostic and Statistical Manual of Mental Disorders in 1980. Characterized by an impairment in the nature and quality of social and communicative development, those with autism spectrum disorders often fail to naturally build social relationships. In a thorough literature review of autism spectrum disorders, theories such as blindness to context in situations, a tendency to systemize rather than empathize, and a cycle of negative peer interaction and social anxiety were analyzed as sources of this disordered social development. In education, an evidence-based intervention approach to promote social interaction and behavioral change is applied behavioral analysis. This systematic use of positive reinforcement

procedures when matched with data collection allows the interventionist to determine the effectiveness of certain motivators in promoting behavioral change. In promotion of intervention methods that are conducive to the classroom environment and each individual, this literature review investigates the effectiveness of applied behavioral analysis, and use of single-case research methodology, to evaluate positive social behavior change in children with autism spectrum disorders.

Hemlock Embryo Rescue Project

Hayden Field
Dr. Scott Merkle, Warnell School of Forestry & Natural Resources

The hemlock woolly adelgid (*Adelges tsugae*), an exotic insect pest, is currently causing widespread devastation of two species of hemlock: eastern (*Tsuga canadensis*) and Carolina (*Tsuga caroliniana*) in the eastern United States. Before all of the surviving examples of these two coniferous tree species are destroyed by this pest, we must attempt to save them. Working with cooperators from Camcore at North Carolina State University, we have used seeds (some up to 10 years old) collected by them from surviving hemlocks from throughout the ranges of these trees to conduct an embryo rescue experiment. We are testing embryo rescue techniques because the longer the seeds have been cold-stored, the less likely it is that they will have high percentages of germination. Our embryo rescue experiment explores alternative methods to encourage seeds from various seed lots of different ages to germinate, using three different seed pre-treatments (intact seed, megagametophyte, and embryo) and two different germination environments (moist germination paper and *in vitro* culture on a conifer germination medium). The end result, which will be measured as the percentage of germination for each seed lot on each treatment, will aid us in determining which treatments are the most promising for producing trees from the stored seeds to aid in restoration of these threatened trees.

Examination of the Function of *cobU* in Vitamin B12 Synthesis in Mycobacteria

Chelsea Fitzhugh
Samantha Tucker, Graduate Researcher
Dr. Frederick Quinn & Dr. Russell Karls, Infectious Diseases, College of Veterinary Medicine

Tuberculosis, caused by Mycobacterium *tuberculosis (Mtb),* is a disease that presents major public health issues across the world claiming over a million lives each year. Although *Mtb* uses cobalamin (vitamin B12) in some metabolic processes, it is unknown if this bacterium synthesizes cobalamin. The *Mtb* genome contains homologs of B12 synthesis genes, including *cobU*, which encodes an enzyme that functions in a late stage of B12 synthesis in other bacteria. The study of B12 synthesis by the slow-growing pathogen *Mtb* is being accelerated by examining the function of homologous genes in the nonpathogenic fast-growing species *Mycobacterium smegmatis*. The overall purpose of my project is to develop and use a suicide plasmid system to generate a *cobU* knockout in *M. smegmatis*. After the mutant has been obtained, it will be complemented separately with *cobU* from *M. smegmatis* and *Mtb*. It is predicted that vitamin B12 production will be blocked in the *cobU* mutant, but restored when complemented with *M. smegmatis cobU*. If the *Mtb cobU* homolog has the same function, it too should restore B12 production. Progress toward this study will be reported.

Membrane Electrode Assembly Preparation Utilizing Platinum Catalysts for Use in Polymer-Electrolyte-Membrane Fuel Cells

David Flake
Dr. Ramaraja Ramasamy, College of Engineering

Clean energy has been a major focus in almost every industry and development of fuel cells is becoming increasingly more prominent in recent years. Fuel cells directly convert chemical energy into electrical energy. Hydrogen gas and oxygen gas are passed through the anode and cathode respectively to produce a difference in chemical potential between the two electrodes. The chemical potential results in an electrical voltage when connected in a circuit. A polymer-electrolyte-membrane fuel cell functions through the separation of oxidation and reduction reactions by use of a semi-permeable polymer electrolyte. In this research, a Nafion membrane, a perfluorinated ion-conducting and electrically insulating membrane, is used as the electrolyte. Within the fuel cell, hydrogen is oxidized into positive hydrogen ions at the anode catalyst and diffuses through the electrolyte. During this oxidation, free electrons are produced and collected with a conductive plate and pass through the circuit. At the cathode, oxygen is reduced at the catalyst layer which results in the production of water vapor. In this research, pre-prepared platinum nanowire catalysts are applied using an air gun to a gas diffusion layer (GDL). A Nafion membrane is placed between two GDLs and then is heated and pressed to form a membrane electrode assembly (MEA). Different parameters of preparation such as the press operating pressure and temperature will be optimized. The power density is maximized by varying gas flow rates, cathode and anode backpressure, operating temperature, and plate pressure. Gas flow rates, cathode and anode backpressure, operating temperature, and plate pressure are varied to achieve the maximum power density possible and compared to commercial products.

Modifying Appointments to the FISA Court

Mitchell (Trey) Flynn
Dr. John Maltese, Political Science, School of Public & International Affairs

With the Foreign Intelligence Surveillance Act of 1978, Congress created the Foreign Intelligence Surveillance Court to hear surveillance warrant requests from executive agencies. Appointment power to the Court was vested in the Chief Justice. My research explores the following questions: Does the current appointment structure enable the Court to review warrant requests with proper scrutiny and jurisprudence? And if not, what appointment structure would be more effective? Drawing from news articles, law reviews, and declassified Court rulings, research suggests that the concentration of appointment power in the office of Chief Justice fails to insulate the Court from political imbalance. Shifting to a Court-based appointment structure that requires Senatorial consent, I propose, would restore the Court to political balance and foster greater scrutiny of surveillance activity.

Healthcare, Genetics, Society and the Black-White Breast Cancer Survival Disparity

DeJuana Ford
Dr. Susan Tanner, Anthropology, Franklin College of Arts & Sciences

Black and African-American (BaAA) women have lower breast cancer incidence than European-American women, but suffer greater breast cancer mortality. This disparity is discussed widely in diverse fields, and the degree to which genetic factors are implicated in the disparity may vary significantly across disciplines. It is important to compare

researchers' assertions about the role of genetics in the disparity with the degree to which BaAA women attribute their relatively lower breast cancer survival rates to genetic versus environmental factors. In this study, I review literature on breast cancer disparities in the U.S. to explore whether researchers in social science, public health, and clinical medicine perceive the disparity as arising more from genetic or environmental factors, and I compare these perceptions to data from literature on BaAA women's perspectives on factors underlying the disparity. Using keywords "breast cancer AND (African-Americans OR black) AND disparity" to search the NCBI PubMed database, I located 140 articles and studied those focusing on factors driving the Black-White breast cancer survival disparity. I categorized articles as "genetic," "behavioral," "healthcare system," or "societal" based on their explanations for the disparity. Preliminary data suggest that differences in tumor type and healthcare system disparities are commonly implicated across fields in driving the survival disparity. Future data will elucidate connections between factors BaAA women perceive as underlying the disparity and statements made by researchers. Understanding these connections is crucial for more informed discussions on the breast cancer disparity and for improved communication between the medical community and minority patients.

Positive Psychology in Teen Mothers

Smitha Ganeshan, Foundation Fellow
Dr. Neale Chumbler, Health Policy and Management, College of Public Health

While the rates of teen pregnancy have been on the decline, the United States continues to have one of the highest rates among developed nations. Teen pregnancy and parenting is associated with societal stigma resulting from a perceived shortcoming of the individual's moral character. Most studies focus exclusively on the negative consequences of stigma on health, social, and behavioral outcomes. An emic perspective on teen pregnancy and parenting mothers is crucial to elucidate the complex and convoluted role of stigma and stereotypes in these women's lives. Pregnant and parenting teen mothers in Indiana were recruited to participate in a journaling study in Lake County, India through a community partner, Empowering Teens As Parents (ETAP) that allowed the mothers to keep daily journals. The journal content of twenty unique individuals were coded and analyzed by NVivo software. Analysis of the data demonstrated that negative stereotypes and stigma do serve as stressors, but that parenting and overcoming these stereotypes generate positive affect that can mitigate or counteract this stress. Parenting's contribution to positive psychology results in positive self-image and augmented motivation. All of the women, regardless of the degree of social support experienced, indicated that their role as a mother was the best part of their life. Further, the desire to provide a good life for their children and the ability to teach their children new things lead to positive self-image and an emphasis on goal-setting, optimism, and happiness.

The Death of the Death Penalty

Richard Gardiner
Dr. James Monogan, Political Science, School of Public & International Affairs

This paper researches why states differ in their capital punishment policies and in the total number of executions. To explore the issue, this research identifies variables that likely shape death penalty policy and practice. The variables that I have identified as possible predictors are state ideology, issue opinion, political culture, unemployment, and violent crimes. The results show that state ideology is a strong predictor of both policy (measured with an original index of death penalty policy) and the number of executions in the states

(measured from 1976-2012). How death penalty policy is made in the U.S. depends on what the states are doing, and this study can help forecast which states are most likely to continue the trend of reducing or even eliminating death penalty provisions in the law.

The Genetics of Early Hybrid Lethality between Two Species of *Mimulus*

Austin Garner, CURO Summer Fellow, CURO Graduation Distinction
Dr. Andrea Sweigart, Genetics, Franklin College of Arts & Sciences

Speciation occurs when genetically diverging populations develop reproductive isolating barriers that limit interbreeding or reduce the viability and/or fertility of their hybrid offspring. The evolution of these hybrid dysfunctions riddled Darwin and his contemporaries because they knew that unfit hybrids could not be favored by natural selection. We now understand that hybrid dysfunction results from incompatible interactions between genes from divergent species; however, our understanding of the identity, number, and function of the genes involved remains insufficient. To resolve this deficiency I am investigating the genetic basis of hybrid lethality between two closely related wildflower species, *Mimulus guttatus* and *Mimulus tilingii,* by 1) Quantifying the strength of hybrid lethality as a reproductive barrier and 2) Identifying the genes involved. To date, I have shown that when these species are artificially hybridized, 99% of the offspring die during early embryonic development, confirming that hybrid lethality is a strong reproductive barrier between these species. Self-fertilizing the few viable offspring, I generated 250 second generation hybrids, F2s, each containing unique arrangements of both parental species genomes. Quantitative measurements of lethality in crosses between these F2s and parental lines indicate that multiple gene interactions underlie this incompatibility. I am now performing genome-wide sequencing on each F2 and will combine our quantitative and genomic data in order to identify our hybrid lethal genes. This project will thus expand upon the solution to Darwin's conundrum by identifying the genes causing hybrid embryonic lethality and providing a basis for understanding their function in creating and maintaining biodiversity.

Mapping the Horn, 1991-2011

Joseph Gerber, Foundation Fellow
Dr. Brock Tessman, International Affairs, School of Public & International Affairs

While the standard political maps are helpful representations of certain realities in international affairs, they are insufficient at capturing the whole picture of any region, and understanding actors' interactions in and among North and South Sudan, Ethiopia, Eritrea, Djibouti, and Somalia requires more than an understanding of those government's actions. It requires helpful representations of the interests and the interactions among many different kinds of actors in this complex, multifaceted and unstable region. This research project's aim is to answer the question of how the Horn of Africa as a region has changed over time with regards to questions most pertinent to the study of international relations. To answer this question, four different aspects of this region are mapped over time in four different sets of depictions spaced along sensible time intervals: 1) each Westphalian state's relative material capabilities; 2) the presence of various significant non-state armed actors; 3) behavior among various ethnic groups, including migration flow and ethnic tension; and 4) various great powers' economic involvement in the region. These maps are constructed from data gathered from 1991 to 2011 and those actors whose interactions in that area have generated sufficient data, either in set or in map form, are represented visually

in the four maps listed above. This data is compiled in spreadsheet format. Specific methods of representing this data are determined sensibly according to what data is available with the guidance of the research mentor.

Neural Abnormalities in Ocular-Motor Inhibition in Schizophrenia, Bipolar Disorder, and First-Degree Relatives

Alan Gerlich
Dr. Brett Clementz, Psychology, Franklin College of Arts & Sciences

Schizophrenia (SZ) and bipolar disorder (BPD) are characterized by poor prefrontal cortex (PFC) mediated cognitive control. Ocular-motor saccade activity is indicative of the deficit in inhibitory control commonly found in BPD and SZ. Furthermore, biomarkers of such a lack of inhibitory control can be isolated and analyzed using high temporal resolution electroencephalography (EEG) in order to pinpoint the neural basis of the phenotypical deficits of BPD and SZ. The current study included 59 healthy control subjects, 43 with SZ, 56 with BPD, 51 relatives of those with SZ (SZrel), and 71 relatives of those with BPD (BPrel). Each subject completed an inhibition control task in which 3 checkerboard patterns were presented in a horizontal row. On prosaccade trails, the subject was asked to make a saccade toward whichever peripheral checkerboard became more luminous after initial presentation, and on antisaccade trials, the subject was asked to make a saccade toward the more-luminous checkerboard's mirror image. Analyses of the EEG data were performed to evaluate event-related potentials (ERP) resulting from presentation of the steady-state stimulus as well as presentation of the pro/anti-cue. Voltage topographies across the scalp at ERP peaks will be compared across groups. We hypothesize all patients and relative groups will show differences from healthy controls, while patients will show greater differences than relatives. Such data could be used to open new avenues of research to help delve deeper into the underlying etiologies, manifestation, and possible treatment of BPD, SZ, and similar disorders.

The Role of O-Linked β-N-Acetylglucosamine in the Epigenetic Regulation of Colon Cancer Stem Cells

Caitlin Gilbert
Dr. Michael Pierce, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Growing evidence suggests that cancer stem cell (CSC) populations have a role in the initiation and maintenance of some cancers. These populations are regulated by post-translational modifications, such as O-linked b-N-acetylglucosamine (O-GlcNAc). O-GlcNAcylation is regulated by two enzymes: O-linked β-N-acetylglucosamine transferase (OGT) and O-GlcNAcase (OGA). The transfer of the carbohydrate O-GlcNAc to cytosolic and nuclear proteins is catalyzed by OGT, and OGA regulates the process by removing the glycan. O-GlcNAcylation is analogous to phosphorylation in the sense that both modifications are notably dynamic. O-GlcNAcylation affects numerous cellular processes, so aberrant expression is hazardous and can lead to many diseases. The O-GlcNAc modification is associated with several different varieties of cancer, but its role is still unknown. OGT utilizes uridine diphosphate N-acetylglucosamine (UDP-GlcNAc), which is produced from extracelluar glucose via the hexosamine biosynthetic pathway (HBP), as the substrate for O-GlcNAc transfer. This metabolic shift from oxidative phosphorylation to the HBP is a hallmark characteristic of cancer metabolism. The transition from oxidative phosphorylation to the HBP results in the up-regulation of OGT, which further suggests its involvement in tumor onset. In current studies, the knockdown of O-GlcNAc is

accomplished in two mammary colon cancer cell lines through transfection with OGA. The following experiments will be performed using these cells lines to determine which genes are regulated by O-GlcNAc and support the idea that the down-regulation of OGT may reduce cancer metastasis. Identification of the genes that are regulated by O-GlcNAc expression could yield valuable targets for cancer therapy and treatment.

Data Analysis of Seawater Samples Collected Off the Coast of Barrow, Alaska

Dylan Goetz
Dr. Patricia Yager, Marine Sciences, Franklin College of Arts & Sciences

Seasonal patterns in the Arctic Ocean are largely affected by environmental factors, including ice cover, temperature, and sunlight. In winter, with lower light availability, there is a drop in biological productivity. During summer, with minimal ice coverage, productivity blooms. Understanding these cycles can help us predict the impact of changes in the Arctic Ocean. To better understand these strong seasonal cycles, my research examines biological and biogeochemical data collected from a series of research expeditions conducted by Yager, Frischer, and Bronk near Barrow, Alaska (71° 21'N, 156° 41'W) over two years during the months of January, April, and August. I hypothesize the nutrient data should reflect the strong seasonal patterns described above. By graphing depth profiles for limiting nutrients and determining the seasonal averages, I compared the nutrient concentrations to predicted general patterns. The samples' inorganic nitrogen concentrations showed a general trend of a large depletion in August, indicating an increase in primary productivity as phytoplankton take up these nutrients. Higher amounts are shown during the winter season when sunlight is less available and sea ice coverage is higher, limiting photosynthesis when heterotrophic bacteria and respiration prevail. These microorganisms incorporate the dissolved organic nitrogen (DON) produced by phytoplankton. By measuring rates of incorporation of radioactive leucine, heterotrophic bacterial production rates can be calculated. The full data set allows us to explore the balance between autotrophy and heterotrophy in the Arctic. Continuing to create data sets like these over time will allow us to observe and predict changes of the ocean climate in the future.

Parent and Child Perceptions of Health-Related Quality of Life and Psychological Functioning in Children with Tourette Syndrome

Charlotte Goldman, Amy Davis, Kelsie Flanigan
Dr. Ronald Blount, Psychology, Franklin College of Arts & Sciences

Tourette syndrome (TS) is a chronic neurological disorder characterized by tics, involuntary behaviors, and vocalizations. The aims of this study were (1) to evaluate the degree of agreement between child self- and parent proxy-reports of health-related quality of life (HRQOL) and psychological functioning in children with TS, and (2) to compare these ratings to normative data for healthy children. Twenty-eight children, ages 8-18, and their parents rated the child's HRQOL and psychological functioning (depression, inattention, and hyperactivity). *T*-test and intraclass correlation (ICC) analyses were used to examine study aims. Parent-child agreement was strong on all HRQOL and psychological functioning domains based on ICC analyses. However, *t*-test analyses revealed that parents reported significantly higher levels of depression than their child. In addition, children reported significantly lower levels of physical HRQOL compared to their parents. Compared to normative data, only parents reported significantly higher levels of depression, and only children reported

significantly lower levels of physical HRQOL. Overall, these results indicate that parent-proxy reports may not accurately reflect children's perceptions of all HRQOL and psychological functioning domains. This study is important because it demonstrates that parent-proxy reports should not be used exclusively, but should be collected in conjunction with child self-reports whenever possible in this population. Variations in the degree of agreement between individual parent-child dyads should be further evaluated with factors such as child age, clinical outcomes, and quality of parent-child relationships.

Applying International Strategies to Domestic Issues of Micronutrient Deficiency

Carver Goodhue, Foundation Fellow
Dr. J. Peter Brosius, Anthropology, Franklin College of Arts & Sciences

This paper provides a brief analysis of micronutrient deficiency in impoverished communities in Athens-Clarke County, its causes, effects, and the possible approaches to resolve it. Our conclusion is that the establishment of a program to fund vitamin purchases for SNAP (Supplemental Nutrition Assistance Program) eligible Athens residents would provide this sector of the population with a cheap, easily implemented method for increasing micronutrient consumption. This option stands in contrast to others which demand a greater investment of time and money on the part of poor communities least capable of supplying it.

Impacts of Organic Soil Amendments on Micro-Nutrient and Carbon Sequestration under Natural Rainfall Conditions, 2010-2013

George Grant
Dr. Mark Risse, College of Engineering

Organic soil additives also considered as amendments have become widely used throughout the agriculture industry in response to controlling soil erosion. This property as well as the sequestration of valuable micro-nutrients and organic Carbon back into the soil are important areas of study given the variety of soil amendments available in today's market. This experiment explores the following scientific questions: how do present day soil amendments affect the accumulation/sequestration of micro-nutrients, % Carbon, and pH stability under natural climate conditions and what duration of time do these effects require to be available in the soil? 5 years (currently the 3rd year) of data collection and analysis will help the agricultural community understand these available soil treatments and their benefits over time when applied to soil as ground cover or amendment. The following data analysis is based on the average % Carbon (Organic matter) and micro-nutrients found in an 18 plot experimental area located off Hog Mountain Rd. in Athens, GA. There are 24 total plots; however, only 18 out of the 24 are being tested. Each plot is 1.52 m × 4.57m set at a 10% slope and exposed to natural environmental conditions. The variable which is being tested is a specific treatment of soil amendment. The five treatments are as follows: control grass (grass seed) (CG), mulch (M), surface compost (SC), incorporated compost (IC), incorporated biochar (BC), and a control bare soil (BS). Other data such as micro-nutrient concentrations, total soil particle mass from erosion, and rain fall occurrences have also been recorded during this experiment; however, the primary area of interest is the relative increase or decrease in % Carbon and

micro-nutrients accumulation over time(annually) in response to the described soil treatment additives and natural climate conditions. The treatments correspond to the plot numbers as follows: BS: 5,9,20; BC: 6,13,21; M: 2,14,23; CG:4,11,24; SC: 3.10,19; IC: 1,12,22; Not Tested Plots: 7,8,15,16,17,18. The plots not tested are due to limited resource availability and to ensure spacing for needed maintenance and soil sampling. The soil data was taken annually starting in 2010. Soil samples were taken using a soil auger. For the BC and IC treatments only two measurements were taken, one at 4-6 inches, and one at 10-12 inches. This is due to the 0-2 inches region being incorporated into the 4-6 region during the beginning experiment (preliminary incorporation of compost and biochar). For the remainder of the treatments three measurements were taken: 0-2 inches, 4-6 inches, and 10-12 inches. (The following data was analyzed by the University of Georgia's Plant and Soil Analysis Lab.) No results are available at this time. A total micro nutrient, pH and % Carbon ANOVA analysis will be presented along with a discussion of results.

Cell Cycle Gating of the Mammalian Sonic Hedgehog Signaling Pathway

Philip Grayeski, Foundation Fellow
Dr. Jonathan Eggenschwiler, Genetics, Franklin College of Arts & Sciences

The Sonic Hedgehog (SHH) signaling pathway regulates cell fate specification, differentiation, and growth within the tissues, such as the central nervous system during metazoan development. While the regulation of cell cycle progression by SHH signaling has been extensively studied, it remains unclear whether the cell cycle controls response to SHH signals such that individual phases can be conducive or refractory for signaling. One reason to suspect this is the fact that primary cilia are required for SHH signaling in mammals, yet in cultured cells the primary cilium is present only in G1 (or G0) phases. A method in our lab was devised to assay the unspliced (intron-containing) mRNA signal of targets induced by a SHH pathway agonist to provide a real-time assay for pathway activity. Using this method, we analyzed the cell's response to the SHH agonist under different culture conditions and measured the half-life of the unspliced messages. The real-time responses will determined with respect to each phase of the cell cycle and these data will be compared to the ciliogenesis profile in each cell cycle phase. These experiments will test the hypothesis that progression though the cell cycle gates Hedgehog pathway activity and that assembly and disassembly of the primary cilium may be responsible.

Neural White Matter Integrity Differs between Patients with Schizophrenia and Healthy Controls

Thomas Greco
Dr. Jennifer McDowell, Psychology, Franklin College of Arts & Sciences

Patients with schizophrenia show alterations in brain structure compared to healthy subjects, and, differences in major frontal white matter (WM) tracts are related to deficits in cognition. Some healthy subjects from the general population, however, also show low levels of cognitive control. The present study sought to examine differences in WM structural integrity between patients with schizophrenia and healthy controls with low cognitive control (LCC). WM integrity was assessed in 15 individuals with schizophrenia and 15 LCC healthy controls using a magnetic resonance imaging (MRI) scanner. Specifically, diffusion tensor imaging, an MRI method which measures the diffusion of water to index the organization of WM, was used to characterize WM structural integrity. In highly organized, densely myelinated WM tissue water, diffuses primarily along the length of axons, as opposed to diffusing randomly in less

organized tissue. Fractional anisotropy (FA) values occur on a scale of zero (total isotropic diffusion) to one (diffusion only along one axis) and are a commonly used index of the extent of directional diffusion, and thus WM integrity. Whole-brain FA values were calculated using TBSS, and 20 major WM fiber tracts were isolated using a standardized WM tract atlas. The preliminary results demonstrate a statistically significant decrease in the mean FA values for multiple frontal tracts in patients with schizophrenia when compared to healthy subjects with LCC. The present study provides evidence to suggest that structural deficits in schizophrenia may be specific to the disease itself, rather than a function of LCC more generally.

Do Knee Straps Decrease Self-Reported Patellar Tendon Pain after Jump Landings?

Megan Griffin
Dr. Cathleen Brown Crowell, Kinesiology, College of Education

Patellar tendinopathy is a common condition in physically active populations, often treated using knee straps to reduce pain, though there is little quantitative evidence supporting this. The purpose of this study was to determine if self-reported pain was lower in those with symptomatic patellar tendinopathy after performing two jump landing techniques with a patellar tendon strap (PTS), compared to a no-strap, control condition (Con). Twenty-nine individuals (female 14, male 15, age 21.3±3.3years, mass 73.2±12.4kg, height 174.7±9.5cm) with patellar tendon pain who scored <80 out of 100 on the Victorian Institute of Sport Assessment Patella (64.8±8.4) indicating decreased knee function, were consented. Participants performed 5 trials of two-legged drop jump landings followed immediately by a 50% maximum vertical jump (DJ) and 5 single leg landings (SL) in both conditions in a counterbalanced order. After completing each set of 5 landings, participants were asked to mark a 100mm Visual Analog Scale (VAS) to indicate their knee pain; participants were blinded to previous VASs. A single rater measured each VAS once and a repeated measures analysis of variance ($p<.05$) was used to determine differences in the VASs between the strapping conditions. There was significantly lower pain reported during the PTS condition than the Con condition for both DJ (Con= 26.28±3.8mm, PTS= 19.24±3.1mm, $p=.003$) and SL landings (Con= 36.28±4.1mm, PTS= 26.9±3.3mm, $p=.001$). The results indicated PTS may decrease acute knee pain symptoms during jump landings as measured by VAS. Future research should elicit the mechanism by which this occurs.

Examination of the Link between Glycosaminoglycans and Pectins

Elizabeth Guarisco, CURO Summer Fellow
Dr. Carl Bergmann, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Glycosaminoglycans (GAGs) are polyanionic macromolecules localized in the extracellular matrix that have important structural roles and are involved in diverse cellular processes including differentiation, communication, proliferation, adhesion, and migration. Thus the impacts of glycosaminoglycans and their degrading enzymes warrant understanding. One way to approach this is the use of non-native GAGs or GAG-like polysaccharides. The corresponding plant matrix polysaccharides are the pectin polysaccharides, partially esterified macromolecular polygalacturonic acids. Glycosaminoglycans and pectins provide, in separate species, similar functions. The similarity between the functions of pectins and GAGs suggests possible insights into the mechanism by which pectins impact human health. Studies in our lab revealed that pectins are able to bind certain glycosaminoglycan degrading enzymes and alter their glycosidic

activity. Likewise, chondroitins, a class of GAGs, are able to bind pectin degrading enzymes and alter activity. Pectin degrading enzymes could alter GAG-moderated cell processes GAGs and chondroitin performance. Testing the effects of non-native GAGs *in vivo* is our next step. Hyaluronic acid (HA) functions in joint connectivity, water transport, receptor-interacting roles in tumor metastasis, and stimulates extracellular matrix production. HA fragment injections into Drosophila cells will allow us to see any functionally relevant effects of the polymer, as HA is not naturally present. The first step in this process is growth and insulation optimization of Drosophila neuronal cells. This *in vivo* approach is likely to reveal new functions for GAGs and new ways to manipulate the availability of these important molecules.

Investigating the Role of HAN Transcription Factors during Plant Development

Vanessa Gutierrez
Dr. Wolfgang Lukowitz, Plant Biology, Franklin College of Arts & Sciences

The development of *Arabidopsis* embryos relies on a sub-family of GATA transcription factors. These genes, which are called HANABA TARANU (HAN), HAN-LIKE 1 and HAN-LIKE 2, are essential for the maintenance of embryonic coordinates, and without them embryogenesis arrests. It is my hypothesis that embryogenesis arrests because HAN mutants do not continue to produce stem cells. To investigate the role of these HAN genes during later stages of plant development in seedlings, I have adopted the approach of using a method called RNA interference (RNAi) to "knock down" HAN expression in normal looking seedlings. This entailed constructing a HAN RNAi vector, a plasmid containing a small fragment of HAN transcript in inverted repeats to form a hairpin. This plasmid is under the control of a promoter that is expressed only in the presence of a hormone, dexamethasone (DEX). I introduced this HAN RNAi construct into the *Arabidopsis* genome using an Agrobacterium and I have conducted experiments to show that the HAN hairpin is indeed expressed in response to DEX treatment. I am currently extending the study to analyze the effects of 'knocking down' HAN gene expression in roots, where I can easily visualize any effects on their development. This will provide me with key information about the ability of HAN genes to regulate plant stem cells, specialized cell-types which play a key role in all aspects of plant tissue formation and plant growth.

The Digital Future – Investing and Investigating

Connor Hamm
Prof. Mark Callahan, Lamar Dodd School of Art

In October 2013 the auction house Phillips partnered with the micro-blogging site Tumblr to create the first ever digital art auction, *Paddles On!*. The auction featured only internet-based and digital art, including webcam recordings, screenshots from video games, and even an entire website, with some works valued over at $10,000. *Paddles On!* epitomizes the artistic, technological, economic, and social implications of positioning digital technology as a dominant and necessary facet of life. But what are these implications? I incorporate arts-based research methods with traditional examination of scholarship in order to investigate the impacts of this auction and of related developments within the art world, such as the Eyebeam Emoji Art+Design Show and the increasing presence of webcam art. I apply my research through creating digital art (including my own Emoji and webcam pieces), and by keeping an evolving critical commentary, all of which are posted on a Tumblr blog. This synthesis of research and application is uniquely

illuminating and has provided innovative and engaged analysis of the real world impacts of digital technology, especially on such issues as the changing nature of the art market, the global reach of Emoji and digital communication, and the power of the digitally-mediated self-image ("selfie"). This combination of objective research and personal application incorporates the very technology that I am studying, and is particularly beneficial in understanding our increasingly networked shared future.

An Integrative Outlook on the State of Sustainable Development in Sarawak, Malaysia

Dayna Hardgrove
Dr. J. Peter Brosius, Anthropology, Franklin College of Arts & Sciences

The palm oil industry is growing rapidly all over the world and is threatening both the rainforests and the indigenous communities that inhabit them. In the Malaysian state of Sarawak, the state government has initiated a major effort to expand oil palm production as part of the state's development program. While the palm oil industry has great economic potential, its rapid expansion is currently displacing indigenous communities from their ancestral lands and causing rapid deforestation. The detrimental effects of this growing industry need to be addressed more effectively by acknowledging the trade-offs between conservation and development and seeking a more sustainable development strategy that is supported by multiple actors: the state government, indigenous communities, and the palm oil industry. This paper applies an integrative framework for analyzing trade-offs from multiple conceptual lenses: values and valuation, process and governance, and power and inequality. Such an approach provides a more comprehensive foundation for addressing the state's development priorities while also supporting conservation and indigenous rights.

Viscosity-Dependent Behavior of Cyclopenta[b]naphthalene Fluorophores

Billie Hardigree
Dr. Mark Haidekker, College Of Engineering

Environment-sensitive fluorescent molecules play a significant role in the biological sciences and biological engineering. Recently, a new polarity-sensitive family of fluorophores was introduced (Kocsis et al., Org. Lett 2012; 14: 4430-33). These cyclopenta[b]naphthalene compounds showed intriguing structural similarity with viscosity-sensitive molecular rotors that we recently examined. Our research goal was to explore potential viscosity-sensitivity of the new cyclopenta[b]naphthalene compounds. Measurements were performed in a Fluoromax-3 fluorospectrometer. Polarity sensitivity was examined in Dimethyl sulfoxide (DMSO), methanol, toluene, and water and methanol mixture, and the exact fluorescence spectrum was obtained by performing matrix scans, that is, emission intensity as a function of both excitation and emission wavelength. Viscosity sensitivity was determined in a mixture of methanol, ethylene glycol, and glycerol at different ratios to afford solutions ranging from 4 mPa s to 167 mPas. Peak emission intensity was recorded as a function of viscosity. Two of three cyclopenta[b]naphthalene compounds exhibited dual emission in the viscosity gradient. Depending on the intramolecular distance of the elements of the fluorescent dipole, the second emission peak showed increasing intensity with increasing viscosity. This was an indication of molecular rotor-like behavior. The polarity tests, however, were more inconclusive, but a general trend was observed that more polar solvents lowered the emission intensity and shifted the emission peak toward shorter wavelengths. We concluded that cyclopenta[b]naphthalene-derived fluorophores, which were originally motivated by the polarity probe Prodan, gain viscosity-sensitive behavior and act as

molecular rotors. However, the viscosity sensitivity strongly depends on the spatial structure of the fluorescent dipole.

Necessity of Universal Pre-Operative Blood Work Testing in Healthy Dogs

Kayla Hargrove
Dr. Erik Hofmeister, Small Animal Surgery, College of Veterinary Medicine

The objective of this research study is to determine if performing pre-operative blood work in otherwise healthy dogs sheds light on enough previously unknown and undiagnosed diseases to warrant screening in all patients. This information would be helpful for pet owners because it could potentially cut the costs of surgery by eliminating blood work from their expenses. This would also benefit veterinarians who want to get their patients into surgery as quickly as possible and don't have time to wait for results from blood work. Cases were identified by the anesthesia records and blood work results of 100 dogs that underwent elective orthopedic surgeries. Data collected includes: name, age, weight, breed, diagnosis/problem, ASA status, reason for anesthesia, date of procedure, and abnormalities found in blood work. Results include 40 cases, 7 of which had abnormalities that would have resulted in a more conservative anesthesia protocol.

Differences between Cohabiting and Non-Cohabiting Couples Who Participated in Premarital Education

Lauren Head
Dr. Ted Futris, Child & Family Development, College of Family & Consumer Sciences

Research on cohabitation - the practice of couples living together prior to marriage - has raised concerns regarding the quality and stability of the future unions of these couples. Premarital relationship education programs have been found to promote healthy relationship behaviors that foster healthy and stable marriages. However, less is known about the effects of these programs on cohabiting couples who subsequently marry. The current study examines couples (n = 83) who completed the PREPARE (PREmarital Personal and Relationship Evaluation) program and compares those who cohabited before marriage (59%; n = 49) to those who did not (41%; n = 34). Data were collected by means of surveys taken prior to the program, two weeks post, six months post, and two years post. Mean scores were examined to explore differences and similarities in marital interactions (e.g., time spent together in shared activities, frequency of disagreements, conflict management), marital quality (e.g., positivity, negativity satisfaction), and marital stability (e.g., dedication, thoughts of divorce, confidence) over time. Preliminary analyses show that, following the premarital education program, male and female cohabiting participants tended to exhibit similar or *more positive* relationship interactions when compared to non-cohabiting participants. Thus, contrary to prior research the risks associated with premarital cohabitation were not found with the present sample. By identifying challenges unique to cohabiting couples, premarital education programs can be adapted to focus on specific needs in an effort to better help couples sustain positive interactions, effectively manage differences, and enhance marital satisfaction and stability.

A Targeted and an Unbiased Screen for Genetic Suppressors of the *Legionella pneumophila* Effector Protein LegC7

Chetan Hebbale
Dr. Vincent Starai, Microbiology, Franklin College of Arts & Sciences

Legionella pneumophila is a Gram-negative bacterium that causes a severe form of pneumonia known as Legionnaires' disease. During infection, *L. pneumophila* secretes nearly 300 effector proteins into host cells in order to evade lysosomal degradation by

modulating vesicle trafficking pathways. One of these effector proteins, LegC7, has been shown to be toxic upon expression in the budding yeast, *Saccharomyces cerevisiae*. Upon LegC7 expression, *S. cerevisiae* accumulates membranous structures reminiscent of so called "class E" compartments, which result from defects in multivesicular body function. The proteins which comprise the Class E VPS family are members of the endosomal sorting complex required for transport proteins (ESCRT) which are responsible for recognizing, sequestering and packaging membrane proteins into vesicles for vacuolar degradation. Because the Class E phenotype was produced in yeast during LegC7 expression, we hypothesize that LegC7 interacts with one or more of the yeast Class E gene products. We therefore continued a targeted screen of the yeast Class E genes by transforming a plasmid encoding LegC7 into yeast strains with deletions of *vps23, vps28, snf7*, or *bro1* and found that deletion of these genes did not suppress LegC7 toxicity. We then performed an unbiased screen in an attempt to find genetic suppressors of LegC7 toxicity using ethyl methanesulfonate (EMS) mutagenesis to isolate a strain that exhibits a toxicity reversal due to a genomic mutation. We will sequence the genome from this strain to identify the gene products that LegC7 might require for toxicity.

Nanoparticle-Delivered Therapeutics for African Trypanosomiasis

Matthew Hess
Dr. Stephen Hajduk, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Trypanosoma brucei causes both Nagana, a wasting disease in cattle, and human African trypanosomiasis, also known as sleeping sickness. In sub-Saharan Africa, an estimated sixty million people are at risk with no available vaccine, and hundreds of millions of dollars are lost in the form of diseased cattle. Our lab previously reported the trypanocidal activity of small, hydrophobic peptides (SHP) that specifically kill blood stream form (BSF) *T. brucei*. Here we package SHP into silica gel, mesoporous nanoparticles (SHP-np) for delivery to *T. brucei*. By measuring the growth of BSF trypanosomes overnight post-treatment, we report 50% survival with SHP-np concentrations of 1mg/mL and 0% survival with concentrations of 5mg/mL. Short-term killing assays indicate that SHP-np concentrations of 10mg/mL completely kill parasites within one hour. A comparison of killing kinetics between SHP and SHP-np shows that free SHP kills rapidly while SHP-np exhibit slower kinetics likely due to controlled release of the peptide. Blocking endocytosis by low temperature demonstrates that uptake of the particles is not necessary for killing. To investigate the specificity of SHP-np, we performed growth and short-term killing assays with human embryonic kidney (HEK) cells. Our results indicate that SHP-np are nontoxic to HEK cells at concentrations sufficient to kill parasites. Furthermore, we show that SHP-np are stable during storage in harsh conditions (37°C for one week). All together, the data suggest that SHP-np represent a potential therapeutic to combat human and animal African trypanosomiasis.

3D Printing Techniques in Topology

Fred Hohman
Dr. David Gay, Mathematics, Franklin College of Arts & Sciences

During the Spring 2014 semester, Dr. Gay and I plan to explore 3D printing in topology by observing the physical geometry of shapes that are particularly tough to visualize. This research will allow us to learn how 3D printers function, test the limits of current 3D printers, and generate mathematical objects that have not been easily explored. To start, we first worked out the mathematical theory behind the creation of the knots, imploring

various concepts such as stereographic projection. For example, one shape to be printed is generated by two cords coming together to form a trefoil knot at the center of the object. Once we had the knot constructed, we began to add other surfaces to the shape to observe the changes in the knot's structure. After finalizing the theory, I generated high resolution 3D models of the desired objects to prepare to print in Mathematica: a symbolic mathematic computer programming environment. With the aid of other modeling software and a MakerBot Replicator 3D printer, I was able to print prototypes of the basic trefoil knot with appropriate supports and code documentation. I successfully published this basic version of the trefoil knot on Thingiverse.com: the official website dedicated to sharing user-created digital design files. I am currently manipulating complex versions of the knot and digitally cutting the surface additions to print separately. Once the components are split in the appropriate way, I plan to print all the pieces in multiple colors so that an observer could pick up the shape and remove surface pieces to reveal the underlying knot at the core.

Increasing Nutrition through Genetically Modified Organisms

Erin Hollander, Ramsey Scholar
Dr. Wayne Parrott, Crop & Soil Sciences, College of Agricultural & Environmental Sciences

Genetically modified foods are organisms meant for consumption in which the genetic code has been changed through human biotechnology. These organisms can be modified for increased yield, nutritional value, or pesticide resistance, and as such have great potential for resolution of the global food crisis. This potential must be tempered by the safety concerns of the long-term effects of GM foods on human and environmental health. Some GM foods such as Golden Rice, however, are modified only for increased nutritional content. This allows impoverished families to obtain necessary nutrients without extra expense. Yet the regulatory obstacles for these crops, despite their safety, are nearly insurmountable. This project analyzes the current regulatory standards for GM foods and assesses policy alternatives: 1) increased government support for public goods research institutions; 2) regulation of GM foods through the same standards as traditional foods; and 3) creation of an international ranking system for GM regulation. After evaluation of the benefits of each option, the third option was selected due to its flexibility and feasibility on an international scale. One major boundary to GM foods such as Golden Rice is the duplication of documentation between countries, as each country has its own rules and requirements that a GM food must pass before it can be planted. The cost and time it takes to pass each standard greatly decreases what a non-profit institution can afford. Standardized ranking would decrease duplication while allowing each country to control the safety level of the GM crops gaining entrance.

Norse Mythology in Modern Popular Culture: Sixty Interviews Conducted in Athens, Georgia and Copenhagen, Denmark during the Summer of 2013

Joseph Hopkins, CURO Summer Fellow
Dr. Alexander Sager, Germanic & Slavic Studies, Franklin College of Arts & Sciences

When we use the phrase Norse mythology, we are referring to a body of texts and images that ultimately stem from the pre-Christian narratives of the North Germanic peoples; tales of gods, beings, and even historic people. This corpus is unique and enigmatic; no other branch of Germanic language-speaking people preserved their traditional pre-Christian narratives to such an extent. Upon the eventual translation and subsequent

reintroduction of these texts into the modern languages of Europe, Norse mythology gained new influence and positions in the now Christianized world, particularly in the cultural spheres of other Germanic language-speaking peoples (such as in England and Germany). The study of the ancient Germanic peoples inspired influential works of art and literature, resulted in a mountain range of scholarship, and became an element of national and ethnic pride and ideology. The latter extension came to a head under the Third Reich, and its defeat led to a lull in popular attention for things 'Germanic'. However, by way of media representations, literature, and, to a lesser extent, new religious movements, Norse mythology is again well represented in the popular culture of modern Germanic language-speaking peoples. Yet how is all this represented in the minds of these modern linguistic descendants? By way of sixty interviews conducted during the summer of 2013 in the southeastern United States (Athens, Georgia) and Scandinavia (Copenhagen, Denmark), this project examines the influence of Norse mythology on individuals between the ages of 18 and 30.

The Negative Side Effects of Organophosphate Pesticide Usage in Thailand

Kirstie Hostetter, Foundation Fellow
Dr. Nicholas Magnan, Agricultural & Applied Economics, College of Agricultural & Environmental Sciences

During the past decade, Thailand's pesticide usage has increased by approximately four-fold as the country has established itself as one of the world's major agricultural producers. This increase in pesticide usage has made organophosphates the most abundantly used insecticide group. However, organophosphate pesticides have detrimental health, economic, and environmental effects. In Thailand, 39% of the population is involved in the agricultural sector and about 12,000 cases of acute pesticide poisoning are reported annually. This statistic is a gross underestimate of actual incidences due to lack of education about poisoning symptoms, lack of proper medical facilities, and a lack of initiative to seek medical help. A literature review and cost-benefit analysis of various policy alternatives was conducted. The criteria used to evaluate the four policy alternatives, which included the status quo, an organic farming initiative, an agricultural worker education program, and bureaucratic streamlining, were cost-effectiveness, overall effectiveness, and political feasibility. Based on this analysis, Thailand's Department of Agricultural Extension should implement a mandatory, nation-wide agricultural worker education program to inform those within the agricultural sector about the negative side effects of organophosphate pesticide use.

The Effect of a Patellar Tendon Strap on Knee Power during a Drop-Jump

Katherine Hsieh
Dr. Cathleen Brown Crowell, Kinesiology, College of Education

Patellar tendinopathy is defined as anterior knee pain with patellar tendon tenderness and is common in jumping sports. Patellar tendon straps are applied as a simple and affordable wearable technology designed to reduce knee pain. There is limited biomechanical evidence supporting straps, but they may alter landing kinetics. The purpose of this study was to determine if a Universal Matt Strap™ increases knee power in a symptomatic population during a drop-jump. Twenty-three recreational athletes (14 females, 9 males, age=21.6 ± 3.5 years, height=174.2 ± 8.3 cm, mass=70.8 ± 10.9 kg) with a history of patellar tendinopathy stepped off a 40cm box, landed on two force plates, and immediately jumped 50% of their measured maximum vertical jump. Five trials were performed with and without the strap in counterbalanced

order. Sagittal plane knee power was calculated, scaled to body mass, and averaged. Peak (greatest positive) and minimum (greatest negative) knee power were compared among strapping and control conditions using paired t-tests ($p<0.05$). No significant differences were found in the peak ($p=0.617$) or minimum ($p=0.613$) values between strapping and control conditions. The Matt strap does not appear to modify concentric or eccentric knee power in patellar tendinopathy subjects compared to a no-strap control condition. Future research should determine if the Matt-strap creates any other kinematic or kinetic changes during jump landing. Alternations in movement pattern may help explain why some symptomatic wearers report improvement in symptoms.

Mitochondrial Up-Regulation after Moderate Exercise in Able-Bodied Individuals with Near-Infrared Spectroscopy

Brice Hsu
Dr. Kevin McCully, Kinesiology, College of Education

The theory of mitochondrial up-regulation after moderate exercise via calcium loading has been suggested, but requires confirmation. By using Near Infrared Spectroscopy (NIRS), mitochondrial up-regulation after moderate exercise can be assessed *in vivo* in healthy-bodied individuals. Understanding mitochondrial function would benefit treatment of mitochondrial-deficient diseases, such as peripheral arterial disease. Mitochondrial recovery testing and analysis were performed on 9 participants (78% male, 23.6 ± 3.1 years old). Changes in the oxygenation of hemoglobin during a series of 15 arterial occlusions were measured in each individual's right medial gastrocnemius before and 5 min after a 6 min bout of plantar flexion targeting 70% max effort. Data on the recovery of mitochondrial oxygen consumption was then used to determine a time constant (Tc) which can be used as an index of mitochondrial function. To better represent mitochondrial recovery, the time constants were converted into rate constants (Vmax/min). The average pre-exercise rate constant was 1.73 ± 2.00 and the average post-exercise rate constant was 2.00 ± 0.42. The average Δrate constant after exercise was -3.8 ± 4.4 ($p=0.008$), showing mitochondrial up-regulation of 15%. Mitochondrial recovery testing using NIRS supported the hypothesis of mitochondrial up-regulation after moderate exercise in the medial gastrocnemius muscle. These findings suggest that there is a possible mechanism towards mitochondrial up-regulation.

Effects of Music on Male Aggression: Do Lyrics Matter?

Courtland Hyatt, CURO Summer Fellow
Dr. Amos Zeichner, Psychology, Franklin College of Arts & Sciences

The purpose of this study was to investigate misogynistic aggression and the factors that inform this behavior. Past research has identified traits that serve as possible predictors of male aggression toward women, such as endorsements of sexist attitudes, high levels of masculinity, and rape myth acceptance. Additionally, past research has found evidence that exposure to media displays of violence increases attendant cognitions regarding violence, and aggressive behavior. This research informs a likely link between sexist attitudes, proximate exposure to violent media, and aggression in a laboratory setting. To examine this relationship, male participants first completed questionnaires designed to gather information about relevant personality and attitudinal traits. In a separate laboratory session, participants were exposed to a piece of music with either aggressive lyrical content detailing a violent act directed toward a woman, or neutral lyrical content. A subsequent laboratory aggression paradigm, in which

participants could either choose to administer electric shocks to an ostensible female confederate or refrain from doing so, was used to operationalize aggressive behavior. It is hoped that this study will elucidate the relationship among ideological attitudes, violent media, and contingent aggression. Furthermore, this research bears clinical significance in its potential for shaping intervention and prevention efforts aimed at reducing aggression and increasing awareness of the effects misogynous media and sexist attitudes have on gender inequality and violence toward women.

Molecular and Functional Characterization of FUCOSYLTRANSFERASE 10 in *Arabidopsis thaliana*

Lisa Ishii, CURO Graduation Distinction
Dr. Michael Hahn, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

The *FUCOSYLTRANSFERASE (FUT)* gene family of *Arabidopsis thaliana* is known to be involved in cell wall biosynthesis. Fucosyltransferases attach fucose to cell wall components, primarily polysaccharides; arabinogalactans, pectins and xyloglucans are known to contain fucosyl residues as part of their structures. *FUT10* has been identified as a member of this *FUT* gene family. In order to functionally characterize the *FUT10* gene, localization of the gene product by expression of a GFP-tagged transgene in tobacco leaves was used. By visualizing the tagged FUT10 protein using confocal microscopy and comparing the pattern of expression with a known Golgi marker, ST-CFP, my preliminary data show that FUT10 is localized to the Golgi apparatus, which is where most polysaccharides destined for the plant cell wall are made. Further confirmation of these results is under way. Additionally, *Arabidopsis* plant lines carrying T-DNA insertions in the *FUT10* gene were characterized using polymerase chain reaction (PCR) amplification of the *FUT10* genic region to determine whether the plant lines were homozygous or heterozygous. Interestingly, I found that all plant lines failed to produce homozygous offspring, allowing me to explore the possibility of homozygous lethality. The *FUT* gene family encompasses ten genes, most of which, with the exception of *FUT1*, *FUT4*, and *FUT6*, have not been functionally characterized. Thus, detailed characterization of the *FUT10* gene is instrumental for a full understanding of the fucosylation of cell wall polysaccharides.

***Mycoplasma gallisepticum* Infection and Shed in Commercial and Wild Turkeys**

Moriah Jackson
Dr. Naola Ferguson-Noel, Population Health, College of Veterinary Medicine

Avian mycoplasmas are pathogens that affect poultry worldwide. The commercial poultry industry has significantly reduced the prevalence of pathogenic avian mycoplasma, although the rate of infection in non-commercial poultry and wild poultry can be relatively high. Domestic turkeys are highly susceptible to *Mycoplasma gallisepticum* (MG) infection, but it is unknown whether wild turkeys are similarly affected. In this study, we compared the infectivity and shed of a virulent MG strain in commercial and wild turkeys. Twenty wild turkey poults were split into 5 groups (n=5) each and housed in Horsfall-type units. At 2 weeks of age, each group was inoculated via intraocular, intranasal and intratracheal routes with a serial dilution of MG culture. Twenty domestic turkeys were similarly split into groups, housed, and inoculated with the dilutions of MG culture. The doses ranged from 1.9 to 4.9 color changing units (CCU) per 100uL. The birds were euthanized at 9 days post inoculation and evaluated by air sac lesion scoring, air sac cultures, histopathology of tracheal sections and quantitative PCR. MG infection was detected in the wild poults at a

lower inoculation dose than the commercial poults. This indicates that the wild turkeys may be more susceptible to MG infection than commercial poults. Wild turkeys and other non-commercial poultry may be significant sources of infection for commercial flocks. Further research is necessary to investigate whether domestic turkeys are more resistant to other infectious diseases and identify the underlying causes.

Investigating the Relationship between the Complement and Coagulation Cascades in Placental Malaria

Tiffany Jenkinson
Dr. Julie Moore, Infectious Diseases, College of Veterinary Medicine

High rates of maternal morbidity, as well as low birth weight and fetal loss, are attributed to placental malaria (PM), the accumulation of malaria infected erythrocytes in the intervillous space of the placenta, the invasion of inflammatory cells, and the release of pro-inflammatory mediators. The over-activation of markers of the coagulation cascade and the accompanying expression of C5a in complement activation have been shown to cause impairment of the surrounding placental tissues. Although coagulation and complement are generally viewed separately, they are activated together in an overlapping manner in response to pathophysiological damage. We believe that thrombin, an abundant serine protease involved in the coagulation pathway, could be a key interaction between these proteolytic activated systems. Our previous studies showed that levels of C5a, crucial in mediating innate host immunity, were significantly elevated in the peripheral and placental blood space of women with PM. Therefore, we hypothesize that thrombin is able to cleave C5 into C5a. To test the fundamentals of this hypothesis we will first determine the presence of C5a in cultures of *P. falciparum* (or uninfected red blood cells, as a control). Cultures will either include or lack the anticoagulant, acid citrate dextrose, and be allowed to incubate. By including or lacking the anticoagulant, we will be able to measure the impact of thrombin generation on the formation of C5a in culture. From this experiment we hope to better understand the mechanisms behind the increased cleavage of C5 into C5a and its relationship to the coagulation cascade.

Biosynthesis of Base J by JBP1 and JBP2

Melissa Jennings, CURO Honors Scholar
Dr. Robert Sabatini, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Leishmania major (*L. major*) is a protozoan parasite that causes leishmaniasis, which affects people in parts of Africa, Asia, South America, and Central America. The Leishmania protozoa are part of a larger class called kinetoplastids which are responsible for deadly human diseases such African sleeping sickness in Africa and Chagas' disease in South America. Research is focused on a novel modified DNA base, called base J, present in kinetoplastid protozoa and shown to regulate RNA polymerase II transcription and gene expression. By understanding base J synthesis and function, researchers may one day be able to develop a specific treatment that will manipulate base J and kill these protozoa. The initial step of J synthesis is catalyzed by two thymidine hydroxylases, JBP1 and JBP2. Somehow these enzymes recognize specific regions of the parasite genome and modify a thymidine base. Our hypothesis is that additional proteins are associated with JBP during base J synthesis. To identify these proteins, we will isolate JBP1 and JBP2 in *L. major* cell extracts followed by mass spectrometry. In order to isolate JBP from the cell, we are creating JBP fused PTP-tag constructs that will be inserted back into the *L. major* genome via homologous recombination and deleting the remaining wild type allele. The appropriate

constructs have been generated and parasite transfections are underway. We will present current data resulting from recombinant *L. major* parasite cell lines and the search for JBP associated proteins involved in J biosynthesis.

Influence of Maternal Presence, Age, and Sex on Social Learning

Thomas Johnston, Ramsey Scholar
Dr. Dorothy Fragaszy, Psychology, Franklin College of Arts & Sciences

Some nonhuman animals learn skills socially; i.e., they have traditions. I am interested in how animals maintain traditions. A previous study showed that capuchin monkeys in captivity developed a traditional technical skill (to get juice from a vending device). Using data from this study, we examined the effects of age, sex, and maternal presence (or absence) on the proximity of monkeys to the device, to begin to understand how young monkeys learned the skill. The data were collected in twelve 30-minute sessions with each of four different groups of tufted capuchin monkeys. All trials were videotaped. The monkeys' interactions with the vending device were coded in playback using one-zero sampling in ten second intervals. Behavioral frequencies were tabulated per individual and visually represented in boxplots. The results presented here are from Group B (3 infants (0 to 2 years of age), 1 juvenile (3 to 4 years of age), 6 adult females, and 1 adult male), the group with the most infants. In this sample, infants stayed in proximity to, contacted, and solved the device more than adults. The lone juvenile was in proximity and contacted the device less than half the amount of the infants but solved almost twice as often. Maternal presence was associated with more frequent proximity, contact, and solving compared to maternal absence. Ultimately we want to determine how social partners affect activity with the device, such as whether joint proximity with others is associated with getting juice. We are exploring this challenging analytical problem now.

Stable Isotope and Crystallinity Variations in Kaolin Deposits of Georgia in Up Dip to Down Dip Occurrences

Adam Jones
Dr. Paul Schroeder, Geology, Franklin College of Arts & Sciences

Kaolin is a one billion dollar industry for the state of Georgia, where it is used primarily in paper coating, but also in plastics, ceramics, paints, and pharmaceuticals. Recently, kaolin has been used in the production of polymer nano-composites, showing its versatility and economic importance. Economically exploited kaolin beds south of the Fall Line are formed by weathering of alumino-silicate minerals, the source being granitic rocks in the Georgia Piedmont region. Variations in the crystal structure and chemical state of kaolinite are vital to how the clays can be used in the production industry. This study examined the δ18O and δD isotopic variation in sediment-hosted kaolin deposits geologically located in up dip to down dip occurrences in the Eocene-aged Huber Formation. When isotopic results from gas-source mass-spectrometry were compared with X-ray diffraction, determinations of kaolinite abundances and crystal structure correlations appeared between isotopic values and mine locations. A general trend of δD enrichment and δ18O depletion in the kaolinite occurs up dip, suggesting that post depositional recrystallization captures exchanges with meteoric water. Kaolinite crystallinity at sequence boundaries also shows considerable variability. The amount of recrystallization undergone and kaolinite purity in a deposit determine the quality and economic worth of the clay. As reserve scarcity increases, selective mining becomes a more viable operating practice, exposing the necessity to understand kaolin deposit quality.

Immunopathogenesis of Placental Malaria in Mice Lacking Tumor Necrosis Factor and its Receptors

Mathew Joseph, CURO Summer Fellow
Dr. Julie Moore, Infectious Diseases, College of Veterinary Medicine

Plasmodium falciparum is the deadliest malaria causing parasite in humans. Malaria during pregnancy is associated with the accumulation of parasitized red blood cells and infiltration of white cells in the placenta. This is known as placental malaria (PM). We hypothesize mice lacking TNF (TNF null mutant) and its receptors (TNFRI null mutant, TNFRII null mutant, and TNFRI/RII double null mutant) will have an altered immunopathogenesis to control mice, not exhibiting the same pathogenesis of TNF driven placental pathology. The experiment uses 330 mice, including TNF RI null mutant, TNF RII null mutant,TNFRI/RII double null mutant, TNF null mutant, control, and wild type B6 (C57BL/6) mice. Each strain is infected with Plasmodium chabaudi through IV injections of 103 infected red blood cells at day 8 to 10 of pregnancy. We will include three different groups for each strain: infected pregnant (IP), infected non-pregnant (INP), and uninfected pregnant (UP). We will sacrifice the mice on days 9, 10, 12, 14, and 18, and organs will be collected for study into TNF and its receptors' effects on PM within these mice. In particular, changes in expression of markers of apoptosis, programmed cell death, and autophagy, intracellular recycling of organelles, will be assessed. Continued study of TNF and its receptors, I and II, promises to reveal common and critical mechanisms which contribute universally to malaria compromised pregnancies.

Integrating of Human Neural Progenitor Cells into a Developing Chicken Embryo for a Toxicology Model

Piyush Joshi
Dr. Steven Stice, Animal & Dairy Science, College of Agricultural & Environmental Sciences

The goal of this project is to establish a developmental toxicology model system which can be used in the field of toxicology and regenerative medicine. Human neural progenitor stem cells (hNPs) will be injected into the developing chicken embryo and then tracked with magnetic resonance imaging (MRI) and GFP fluorescent cell tracking. To accomplish this, hNPs will be labeled with iron nanoparticle MRI contrast agents and injected into the chicken embryo at stage 15 in hopes of integrating those cells into the central nervous system (CNS) of the chicken. At specific endpoints, the chicken embryo will be imaged to assess cellular integration. When successful, this will provide us with a developmental toxicology model for further studies intending to assess the impact of endocrine active compounds (EACs) and other toxins on neural development.

The Pathogenicity of *Mycoplasma gallopavonis* in Wild and Commercial Turkeys

Rachel Jude
Dr. Naola Ferguson-Noel, Population Health, College of Veterinary Medicine

Mycoplasma gallopavonis has been commonly isolated from wild turkey (*Meleagris gallopavo*) populations throughout the United States, and the prevalence of infection has been estimated to be very high. *M.gallopavonis* has also been isolated from domestic turkeys that can be readily infected with the organism by contact with wild turkeys. Although the avian *Mycoplasma spp*. that are known to be pathogenic to domestic poultry have been extensively studied, there is currently no

objective information available on whether this common *Mycoplasma* infection can impact the health and survival of turkeys. In this study the pathogenicity of an isolate of *M.gallopavonis* was investigated in commercial and wild turkey poults. Twenty domestic and twenty wild turkey poults were inoculated at 3 weeks of age with *M.gallopavonis* via intraocular, intranasal, intra airsac, intra footpad and intravenous routes. Ten commercial and ten wild turkeys were evaluated and compared to non-inoculated controls at 14 and 21 days post challenge by gross and histological examination of tissues. The primary lesion observed in infected birds was synovitis in footpads and associated lameness. The joints were swollen and contained purulent exudate. The domestic turkeys were more severely affected than the wild turkeys. This study is the first investigation into the pathogenicity of *M.gallopavonis* and its potential impact on wild and commercial turkeys in the United States.

The Executive Science Network: Variations between Public and Private Trustee Networks

Shalin Jyotishi
Dr. Sheila Slaughter, Institute Of Higher Education

The Association of American Universities (AAU) is an invite-only association comprised of 62 elite research-intensive universities. Due to their status as leaders in research, AAU universities become prime incubators for the process of technology transfer, which is characterized as the process of commercializing the research of a university scientist. Prior research has revealed the potential for conflict of interest between the individual scientist and business leaders; however, there is little to no research regarding university trustees and their relationships with business leaders. Trustees act as stewards of a university and sit at the top of the university hierarchy. They are usually highly influential leaders who may also sit on boards of external corporations. Trustees often join a broader "executive science network" because, as directors of both universities and science-based corporations, these trustees are in a position to influence discovery and innovation from the highest level of organizational authority. This study seeks to identify industry-academy relationships among AAU university trustees and independent business firms by constructing a database and using social network analysis. Specifically, a component of the research will address network variations among public and private university trustees. Research has revealed private universities contain highly concentrated networks, while public universities form less robust relationships with industry. Through this study, there lies potential to contribute to public policy concerns regarding understanding of conflict of interest issues, mapping areas of overlapping research interest between industry and the academy, and comprehending how networked universities cooperate with for-profit industry firms.

Identifying Interacting Proteins in the Karrikin and Strigolactone Signaling System

Nikhil Kamath, CURO Graduation Distinction
Dr. David Nelson, Genetics, Franklin College of Arts & Sciences

Karrikins, chemical molecules found in smoke from burning plant matter, and strigolactone, a plant hormone, both act as plant growth regulators that affect the development of plants. Both molecules act through alpha/beta-hydrolase proteins called KAI2 and D14. These receptors genetically interact with MAX2, an F-box protein that ultimately allows the molecules to elicit phenotypic responses affecting branching, height, senescence, hypocotyl elongation,

germination, and root development. F-box proteins characteristically mediate ubiquitination of proteins, targeting them for degradation by the 26S proteasome. SMAX1 and its seven homologs in Arabidopsis have recently been proposed to be candidate targets of MAX2. However, MAX2 may also form complexes with many other proteins. Additionally, downstream physical interactions with SMAX1 have not been deeply studied. We aimed to identify novel protein partners using a truncated form of MAX2 that does not have an F-box domain. Without this domain MAX2 should still bind its normal protein partners yet not be able to bind ubiquitination machinery. Without the ubiquitination machinery MAX2 should be unable to facilitate degradation of its protein partners as usual. We stabilize these preserved protein interactions with MAX2 and purify them through coimmunoprecipitation assays.

The Role of tRNA Nucleotidyl Transferase in tRNA Processing in *Escherichia coli*

Francine Katz
Dr. Sidney Kushner, Genetics, Franklin College of Arts & Sciences

The CCA-adding enzyme tRNA nucleotidyl transferase, encoded by the *cca* gene, synthesizes and repairs the 3'-terminal CCA sequence of tRNAs in both prokaryotic and eukaryotic organisms. It is a member of the superfamily of enzymes that also includes poly(A) polymerase I (PAP I), encoded by the *pcnB* gene, which is the major polyadenylating enzyme in *Escherichia coli* and acts by adding adenosine residues to the 3' ends of mRNAs and tRNAs. All the tRNA genes in *E. coli* have the CCA nucleotide triplet encoded within their DNA sequences, so it is thought that the protein functions mostly to repair tRNAs without an intact CCA sequence which may have been removed by tRNA processing ribonucleases during maturation. Our objective is to characterize the properties of various *cca* mutant strains to study the relationship between the CCA-adding enzyme, PAP I, and specific tRNA-processing enzymes (RNase PH, RNase T). Initially we have examined the growth properties of various multiple mutants. Dot blots and Northern blot analysis will be used to study poly(A) levels and the nature of 3' ends of specific tRNA transcripts respectively. RT-PCR cloning of specific tRNA transcripts will allow us to examine the exact nature of the tRNA 3' ends in *cca* mutants. Our findings are expected to provide new insights into the interactions between tRNA nucleotidyl transferase and other key enzymes involved in the processing of tRNAs in *E. coli*.

Attacking the Fire and Fuel: Nano Formulation of Platin-A for Cancer and Associated Inflammation

Samuel Kennedy, Trenton Berding
Prof. Shanta Dhar, Chemistry, Franklin College of Arts & Sciences

A strong association between chronic inflammation and cancer plays roles in prostate cancer. We recently constructed a Pt(IV) prodrug Platin-*A* with the ability to release cisplatin, a widely used chemotherapeutic, and aspirin, an anti-inflammatory agent. Platin-*A* showed enormous potential for further development. However, clinical translation of small-molecule based therapeutics requires a suitable delivery system to achieve favorable pharmacokinetic parameters and appropriate biodistribution. In this presentation, a promising strategy to entrap Platin-*A* in biodegradable polymeric nanoparticles will be discussed. Specifically, we will focus on the role of the mitochondria in coordinating signaling pathways in cancer-associated inflammation. Activation of various proteins causes mitochondrial dysfunction, resulting in mitochondrial reactive oxygen species production and downstream signaling that

promote inflammation-associated cancer. Using a mitochondria-targeted polymeric-nanoparticle as a delivery vehicle, we anticipated that Platin-*A* could be re-routed to the mitochondria of cancer cells and attack the mitochondrial DNA, thereby designing a targeted pathway for the well-established drug cisplatin. A promising strategy for achieving this goal is discussed here.

Nationalism vs. Global Jihad: Al-Qaeda and Precursors in Algeria, Somalia and Yemen

Melanie Kent
Dr. Seema Gahlaut, Center for International Trade and Security

Global jihad is inherently universalist and trans-national, and therefore opposed to Islamic nationalism. Al-Qaeda has not only rejected Islamic nationalism, but has also been able to successfully influence a number of Islamic nationalist groups to pursue global jihad and target their foreign as well as domestic enemies both within and beyond national boundaries. What explains this success? This research focuses on three terrorist organizations, now officially associated with al-Qaeda, that have nationalist goals: al-Qaeda in the Lands of the Islamic Maghreb, al-Qaeda in the Arabian Peninsula and Harakat al-Shabaab al-Mujahideen. Their choice of targets over time is used as an indicator of their evolution from nationalism to global jihadism. The research attempts to understand if this evolution is a reflection of a strategic or ideological change. If the evolution is a result of strategic change, i.e., a response to specific threats to the organizations' survival, we should see an increase in factors such as: external anti-terror operations against it, local competition from other groups and difficulty in expanding funding, recruitment or expertise. If the evolution is the result of a change in ideological beliefs, we should see changes in the character of leadership ties to al-Qaeda and in the organizations' popular support. As terrorist groups become aligned with larger movements, they gain access to additional funds, expertise, recruits and affirmation, making them more dangerous. It is in the interests of anti-terror agencies around the world to understand the rationale behind such alignments in order to better prevent and combat them.

Marital Security, Depression, and Sleep Quality: Assessing Bidirectional Associations with Actor-Partner Interdependence Model

Yuri Kim
Dr. Steven Beach, Psychology, Franklin College of Arts & Sciences

Perceptions of relationship security and self-reported depressive symptoms have been implicated as important contributors to the understanding of sleep quality (Troxel, Robles, Hall, & Buysse, 2007; Sutter, Zöllig, Allemand, & Martin, 2012). The purpose of this study is to examine an integrative model that investigates the dyadic relationship between marital security, self-reported depressive symptoms, and sleep quality. A total of 196 African American married couples were asked to participate in this study. Participants were asked to complete a battery of questionnaires measuring perceived marital security, self-reported depressive symptoms, and sleep quality. The Actor-Partner Interdependence Model (APIM) was used as a framework for statistical analyses in order to incorporate responses from both members of a dyad into a single model and control for the correlated nature of spouses' reports. There were no significant partner effects. However, there were statistically significant actor effects for husband's depression, wife's sense of security in the relationship, and wife's self-reported depressive symptoms on self-reported sleep quality. In conclusion, self-reported depressive symptoms predicted sleep quality for both partners but did not predict

partner sleep quality. For wives only, relationship security accounted for variance in sleep quality beyond the effect depressive symptoms, but again there was no partner effect. Future research and further implications are discussed.

Closing the Income Gap – Education and Technology in the United States
Paul Kirschenbauer, Foundation Fellow
Dr. Santanu Chatterjee, Economics, Terry College of Business

This paper explores the effects of technology and education on income inequality in the United States. Drawing from bodies of research pertaining to these three factors and their interactions, this thesis begins with an exploration of US income inequality, both past and present. Income inequality expansion over recent decades is largely explained by evidence of earners in the top end of the income spectrum having enjoyed income growth of a much greater magnitude than earners in the lower end of the spectrum. A great deal of this may be attributed to the increased prevalence and utilization of technology by government, businesses and consumers. Ample evidence exists to support the notion that technology increases the wages of skilled workers (typically high earners), while simultaneously decreasing those of unskilled workers (typically low earners). As a means to decrease the skill premium, and thereby decrease income inequality, I recommend an increased investment in public education through scholarships for college tuition. As this thesis elucidates, any such attempt at implementing education policy must be carefully planned and correctly executed (in this case, awarding scholarships based on both merit and financial need) to achieve the desired result of closing the income gap. Otherwise, it may actually increase the income gap in the United States.

Decreasing Summer Learning Loss among Low-Income Students in Athens-Clarke County
Shaun Kleber, Foundation Fellow
Dr. Janna Dresden, Elementary and Social Studies Education, College of Education

Summer learning loss is the phenomenon of children losing knowledge and proficiency in skills—such as reading ability—during the months-long summer vacation. Low-income students suffer most, specifically in reading achievement, because of their lack of access to enrichment opportunities and resources that higher-income students enjoy. The problem is especially severe in Athens-Clarke County given the very high poverty rate. Summer learning loss also creates an ever-expanding achievement gap between low- and higher-income students that presents a myriad of problems as students progress through their later years of school. There are a few policies already in place in Athens-Clarke County to address this issue, but each program leaves gaps unaddressed. A literature review and multi-goal analysis revealed that, through a policy aimed at increasing access to educational resources such as books, the problem of summer learning loss could be significantly reduced. This would help close the achievement gap, decrease the dropout rate, increase the graduation rate, and boost the overall success of a huge portion of the student population in Athens-Clarke County.

Henry V: Legitimacy in Kingship and Film
Hannah Klevesahl
Dr. Fran Teague, Theatre & Film Studies, Franklin College of Arts & Sciences

William Shakespeare's *Henry V* (1599?) is the fourth play in a series that showcases the decay of moral legitimacy of kingship. The tetralogy begins with the murder of Richard II and the takeover of Henry IV, which leads to civil war. When Henry V becomes king in the

fourth play, he seems to reverse this trend with the victory over France at Agincourt. Since the advent of modern cinema, however, the play's performance history has been altered dramatically, as has the character's interpretation. The two most notable film versions of *Henry V* – and the ones that are discussed in this paper – are Laurence Olivier's 1944 version and Kenneth Branagh's 1989 version. Olivier's 1944 film portrays Henry V as a national hero, while Branagh's 1989 version gives us a much darker and unglamorous view of kingship. Since these films are adaptations of the same play, I chose to research whether the radically different adaptations of the title character in Henry V – and, therefore, the tone of the film – are legitimate. I will look at critiques from both movies and attempt to validate or invalidate those criticisms by examining the actors' thoughts behind themes of *Henry V* – as well as their opinions on the role – upon which both Branagh and Olivier wrote. I will then endeavor to show evidence that evaluates their production choices, based on the actors' performance and technical production of the "Once more unto the breach" speech in Act III, scene I of *Henry V*.

Building a Record: Requesting Roll Call Votes under Changing Institutions

Cody Knapp, CURO Honors Scholar
Dr. Anthony Madonna, Political Science, School of Public & International Affairs

The roll call voting behavior of members of Congress is a frequent subject of research on congressional politics, with prior research examining the determinants of members' voting behavior and the development of statistical models to scale roll call votes. Scholars of congressional politics have given less attention to the data generating process through which roll call votes arise. Understanding who requests a roll call vote allows scholars to investigate an important question: Do legislators engage in strategic behavior when requesting that a specific vote receives a roll call? I utilize an original dataset of all amendment votes on major legislation from the 57th to the 68th Congress to examine which legislators request roll call votes. The time period of this study is advantageous because the adoption of the Seventeenth Amendment, which instituted the direct election of U.S. Senators, provides a unique opportunity to assess how institutional change influences members' propensity to request roll call votes. This study focuses on two different aspects of the roll call request process. First, I determine which legislators request a roll call vote. Of particular interest is the extent to which the characteristics of the members who request a roll call diverge from the average legislator. Second, I examine whether members are more likely to request roll call votes for issues they favor or oppose. In doing so, it is possible to discern whether members were more likely to request a public vote in order to signal support for or opposition to an amendment.

The Trade-Off between Mating and Fighting in *Nicrophorus vespilloides*

Kyungmin Ko, CURO Graduation Distinction
Dr. Allen Moore, Genetics, Franklin College of Arts & Sciences

Individuals have finite resources to allocate to three major life-history components: somatic maintenance, growth, and reproduction. When division of resources amongst these cannot ameliorate two traits simultaneously, one trait is optimized and the other weakened. This phenomenon is called trade-off. For most species, if the components are in opposition, trade-offs are likely. Male burying beetles, *Nicrophorus vespilloides*, have many traits that they must perform to be highly successful: resource finding, mating, fighting, and parental care. Among such abilities, trade-offs are likely to occur since each is highly related to fitness. I hypothesized that a trade-

off could exist between mating and fighting. I chose mating as one component of this study because, prior to my experiment, three replicated population lines had been artificially selected by high or low rate of male attempts to mate with females within the first 30 minutes of pairing. I chose fighting because, theoretically, males that invest a majority of their resources here are unlikely to attempt mating as frequently as those that invest more in mating. Individuals from differing line types were pitted against each other over possession of a reproductive resource, a mouse carcass. After conducting 240+ trials, winners were determined based on body mass rather than artificial selection of mating rate. Since body mass was not controlled for, I could not detect if different line types were affecting competitive ability in individuals. Therefore, I am unable to conclude that there is an evolutionary trade-off between mating and fighting ability in *Nicrophorus vespilloides*.

Density Dependent Regulation of Survival and Reproduction in Dogbane Beetles and Underlying Host-Plant Interactions

Carmen Kraus, Ramsey Scholar
Dr. Richard Shefferson, Odum School of Ecology

Ecologists have long debated the factors most responsible for population regulation, including the relative importance of top-down (predation) versus bottom-up (food quality) forces. This experiment examined *Chrysochus auratus*, the dogbane beetle, a specialist herbivore that consumes and sequesters toxins from *Apocynum cannabinum*, the dogbane plant. I conducted a field experiment to examine if *C. auratus* populations are regulated through density dependent survival or reproduction, and whether survival and reproduction are sensitive to bottom-up forces including host-plant quality and plant chemical defenses. I caged the beetles on stems of *A. cannabinum* at four densities with eight replicates per treatment. I tracked beetle survival, collected egg capsules, and measured plant quality traits. I found evidence for density dependence in the reproduction, but not the survival, of *C. auratus*. There was an effect of beetle density on egg mass production, which varied over time. The rapidity of the effect on reproduction indicates that an induced defensive response of the plants may be responsible. I also found strong effects of the beetles on its host plant, with significant reductions in plant growth and leaf area with increasing beetle density. The strong effects on plants likely explain the beetles' density dependent reproduction. To my knowledge, no other studies have examined how bottom-up forces regulate populations of aposematic (warning coloration) species.

Glycoproteomic Approaches for Pancreatic Cancer Biomarker Discovery

Anjali Kumar, CURO Honors Scholar
Dr. Lance Wells, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Pancreatic cancer has one of the lowest 5-year survival rates. The high mortality rate, due in large part to a lack of diagnostic tests and thus late stage detection, has created an important role for pancreatic cancer researchers to change these statistics through discovering more efficient methods for detecting pancreatic cancer early. We are studying pancreatic ductal fluid (PDF) samples which contain proteins and sugars that may aid in finding early diagnostic biomarkers. In our current studies, we are comparing PDF from healthy, chronic pancreatitis and pancreatic cancer patients. Since cancer causes inflammation, we are using the PDF from patients with chronic pancreatitis as our baseline control instead of healthy individuals. My role in this project is to isolate the proteins from PDF, release and permethylate the O-glycans, and perform mass spectrometry analyses to assign and quantify the O-glycans. The goal of this work is to find

glycan/protein biomarkers for pancreatic cancer with the hope that this would increase the survival rate of pancreatic cancer.

A Tax-Deferred Trust: Reducing the Financial Burden of Families with Special Needs Children

Mitra Kumareswaran
Dr. Scott Ardoin, Educational Psychology & Instructional Technology, College of Education

In the United States, over twenty million families have a special needs member. Many are children who need extensive healthcare support and provisions for daily living. On top of current expenses, parents must plan how to financially support their special needs children throughout adulthood. Depending on the IQ level, the lifetime expense for the disabled can reach $2.3 million. The average income of a typical middle-class family is currently decreasing, yet the number of families with a special needs child is increasing. Current federal entitlements may also not meet the demands of the future disabled population. If these trends continue, a financial strain will be placed on parents and the state. Currently, special needs trust funds can be created for a beneficiary whose disability impairs the ability to engage in any substantial gainful activity. A literature review was conducted to outline potential policy solutions to assist parents and the government in better providing for special needs individuals. Three viable policy alternatives were identified and then evaluated on the basis of three criteria: cost-effectiveness, political feasibility, and improvement in quality of life for special needs children. The proposed tax-deferred special needs trust fund follows a combined format of 401 (k) and Roth IRA plans so that money deposited into the trust and dividends are tax exempted. This trust reduces the financial strains on parents and society because by not taxing a small portion of the parents' earnings, the government ensures that more money is later available to provide for special needs individuals.

Mapping of the oriT Region of the Virulence Plasmid of *Rhodococcus equi*

Jacob Kumro
Dr. Mary Hondalus, Infectious Diseases, College of Veterinary Medicine

Rhodococcus equi, an aerobic, Gram-positive soil-derived bacterium, is a common cause of chronic granulomatous pneumonia in grazing herbivores and persons with immune deficiencies such as those infected with HIV virus. The virulence plasmid responsible for its disease-causing capacity is transferable to recipient bacteria through conjugation. The plasmid oriT region is essential to conjugation, containing both the nicking and binding sites for TraA, a protein essential for plasmid transfer. Through a series of subcloning and deletion analyses, the oriT has been localized to a 178bp region of the virulence plasmid. This region, when cloned in cis on a small, normally non-conjugating plasmid, confers transmissibility of that plasmid provided the donor *R. equi* strain also carries the virulence plasmid encoding the conjugation machinery including TraA. To identify the specific residues essential for oriT function, the 178bp region of the recombinant plasmid was subjected to timed exonuclease III cleavage. Several of the exonuclease-exposed plasmids were found to be no longer conjugable. Sequencing of the oriT regions of these conjugation defective plasmids is currently underway to identify the deletion mutations associated with loss of plasmid transmissibility. Also ongoing are efforts to express and purify recombinant TraA protein for use in electromobility shift assays (EMSAs). These assays will confirm the interaction of TraA with the wildtype oriT and loss of TraA binding to the mutated fragments associated with defective conjugation. Identifying the TraA interacting

regions of oriT is crucial to understanding the mechanism of conjugation, an important means by which genetic exchange occurs between bacterial species.

The Dynamics of MglA in *Myxococcus xanthus* Motility Systems

Sudeepti Kuppa
Dr. Lawrence Shimkets, Microbiology, Franklin College of Arts & Sciences

Myxococcus xanthus cells, when starved, coordinate with other cells in their surrounding area to form fruiting bodies in which cells differentiate into dormant spores. These bacteria glide on solid surfaces and periodically reverse their movement, the direction of which is controlled in part by motility proteins MglA and MglB. These proteins localize to opposite poles of the cell, where MglA is at the leading pole and MglB toward the lagging pole. When MglA and MglB switch poles, the direction of the cell reverses, a process which takes place every 5-10 minutes. We hypothesize that the localization of these proteins within the cytoplasm directs cell movement and aids coordination during and after development of the fruiting body. This project involves creating deletion mutants of MglA and MglB and separately tagging them with fluorescent proteins in order to observe localization of MglA and MglB as well as detecting differences between wild type and mutant movement during sporulation and fruiting body formation. Collection of cell reversal frequency data is in progress for the MglA deletion mutant. MglA and MglB have both been tagged with fluorescent proteins tdTomato and sfGFP, respectively. They will be transformed into *Myxococcus* xanthus and viewed under phase contrast microscopy to visualize their localization within the cell. We also hope to learn how MglA and MglB interact during the reversal and how this affects the directional movement in the short term.

How to Tackle the Bike Share Helmet Problem

Torre Lavelle, Foundation Fellow
Prof. Kevin Kirsche, Director of Sustainability

The reinvention of city and campus transportation is demonstrated most clearly by the popular embrace of bike share programs, short-term bicycle rentals provided at unattended stations. According to both *Annals of Emergency Medicine* and *Time* magazine, however, the discrepancy in helmet use among bike share riders as compared to personal bike users is the one impediment to bike shares' integration into communities. Because helmets are not available at rental stations, New York City's Citi Bike bicycle share program currently recommends that its participants bring a helmet from home. In addition, the company offers $10 helmet coupons for annual members and encourages helmet rentals through a rental company. Nevertheless, geographic inaccessibility is one of the most cited reasons why bike share participants do not wear helmets and any off-site spree to attain a helmet deters commuters, tourists, and quick trips. After conducting a thorough review of existing literature, a multi-goal analysis was performed on multiple policy options, and it was determined that helmet rental vending machines, currently undergoing local expansion at Boston bike share hubs, demonstrate a feasible method to gaining onsite helmet accessibility. Integrating the $2 cost of this vending machine helmet rental into Citi Bike's bike rental fee would challenge an added optional expense that would discourage bike share users from achieving a safe biking experience. A bundled fee still provides the choice to individuals of whether to use a helmet, but with it comes the opportunity to not have to decide between cost and safety.

Abstracts

Wavefront Sensorless Adaptive Optics with Differential Interference Contrast Microscopy

Keelan Lawrence
Dr. Peter Kner, College of Engineering

Many unstained biological specimens cannot be seen when in focus under an ordinary transmitted-light microscope because they are transparent. These transparent samples can be seen with microscopes that convert phase variations due to the refractive index variations into intensity variations by use of interference methods. Differential-interference-contrast (DIC) microscopy is an interference method commonly used for the study of transparent specimens. The DIC image is formed from the difference in phase between two light waves separated by a small lateral displacement. When imaging through tissue samples many microns thick, the light becomes aberrated traveling through the sample, resulting in a distorted, lower resolution image. We demonstrate that adaptive optics can correct distortions in the image, resulting in sharp DIC images throughout multicellular organisms. Adaptive optics improve image resolution by correcting changes to the optical wavefront caused by optical aberrations with the use of a deformable mirror. We determine the optimum correction from a sequence of trial aberrations applied to the deformable mirror. For each trial aberration, we calculate a "metric" which measures the amplitudes of a band of spatial frequencies to be maximized. Trial aberrations were applied on the deformable mirror while looking at the image of a single latex bead. We demonstrate that the maximum intensity of a bad image can be improved by over a factor of 20. We then image *C. elegans* biological samples and correct the DIC images with adaptive optics. DIC imaging with adaptive optics represents a significant improvement over conventional DIC imaging.

The Emergence of Sustainability as the New Dominant Logic in Business

Jessie Lian, Alex Ballasiotes
Dr. Richard Watson, Management Information Systems, Terry College of Business

Every firm needs to establish its dominant logic, which is the critical factor that a business must consider when it makes key decisions. Dominant logics have progressed from goods-dominant (success determined by the ability to produce the most goods with the fewest inputs) to service-dominant (success determined by the ability to retain customers and please them). Firms now face the emergence of a new dominant logic, whereby success is determined by the capacity to conserve resources and provide the most value with the least unsustainable inputs. Our research considers the issues that firms must address during this migration. Through an analysis of corporate annual reports, sustainability reports, and interviews with Chief Sustainability Officers (CSOs), we show that there has been a marked shift in the mentality of motivations for business decisions across industries. Industry leaders understand that a transition to a sustainability focus not only must take place, but will also benefit their company's success. As these findings add to the body of work supporting the transition to sustainability-driven dominant logic, there are important implications for the future of businesses. In particular, we consider the implications for information systems, as they have historically supported the needs of the current dominant logic. Looking to the future, it clearly will be important for observers of the business world, as well as those who operate within it, to understand and utilize sustainability dominant logic and build appropriate information systems.

Abstracts

The Relationships between Zinc and Bone Strength in Healthy Children

Andrea Lobene
Dr. Richard Lewis, Foods & Nutrition, College of Family & Consumer Sciences

Zinc is an essential micronutrient required for childhood bone growth. Zinc deficient children have impaired skeletal development, but it is unclear in healthy children if zinc nutriture is associated with bone strength. The purpose of this study was to determine relationships between dietary and serum zinc and bone measures in white girls entering puberty (11.3±1.3 years of age; n=39). Dietary zinc was assessed using three-day diet records and serum zinc by atomic absorption spectrophotometry. Peripheral quantitative computed tomography was used to measure trabecular and cortical bone geometry at the radius and tibia. Bone mineral content of the total body, lumbar spine, and hip was determined by dual energy X-ray absorptiometry. Mean zinc intakes and serum zinc values were 9.8±4.4 mg/day and 8.8±3.2 mg/dL, respectively. There were significant positive correlations between dietary zinc and several trabecular bone outcomes at the tibia, including trabecular bone strength index (BSI; $r=0.59$, $p<0.001$) and periosteal circumference ($r=0.36$, $p<0.04$). When controlling for energy intake, the correlation with BSI remained significant. There were no positive correlations observed at the radius or with tibial cortical bone, and there were no significant correlations between serum zinc and any of the bone outcomes. These results suggest a link between dietary zinc and trabecular, but not cortical bone strength at the weight-bearing tibia. Since the majority of bone mass is achieved by late adolescence, a zinc intervention trial is warranted to more adequately determine the influence of zinc on bone strength and the potential for osteoporotic fracture prevention later in life.

Development of an In-Frame Deletion System for *Ruegeria pomeroyi*

Amala Malladi
Dr. William Whitman, Microbiology, Franklin College of Arts & Sciences

Ruegeria pomeroyi DSS-3 is an alpha-proteobacteria isolated from coastal Georgia capable of metabolizing the organosulfur compound dimethylsulfoniopropionate (DMSP). DMSP contributes to the global sulfur cycle and marine microbial sulfur and carbon metabolism. To extend the few genetic manipulation tools and antibiotic resistance markers available for use in *R. pomeroyi,* an in-frame deletion system for *R. pomeroyi* is being developed using flippase (Flp)-flp recognition target (FRT) recombination techniques. First, a second antibiotic resistance marker was required. The plasmid pFLP2 carrying ampicillin resistance from *Escherichia coli* was transformed into *R. pomeroyi*. The stability of the pFLP2 plasmid was checked by passing the transformant three times and extracting the plasmid after each passage. It was found to be retained by gel electrophoresis, providing another antibiotic resistance marker in *R. pomeroyi*. Next, FRT sites were added to the tetracycline resistant (TetR) cassette for homologous recombination into the *R. pomeroyi* genome. PCR demonstrated that the TetR cassette was integrated correctly. The final step involved the amplification of regions upstream and downstream of the *katG* gene from *R. pomeroyi* to be used for homologous recombination with the TetR cassette. This attempt to amplify regions surrounding the *katG* gene has not yet been successful. These experiments increase the genetic techniques available in *R. pomeroyi*.

Abstracts

Job Training to Combat Poverty among Unemployed Coal Miners

Molly Malone
Dr. David Williams, Religion, Franklin College of Arts & Sciences

In recent decades significant changes have been made to reduce environmental harm by the coal industry, including more stringent regulations for coal mines which force mines unable to comply to shut down. Many towns which depend on their coal mine as a source of livelihood fall into poverty without other employment options. In some coal mining counties in Kentucky, 72% of income is from the coal industry, and in the past two years alone over 4,000 mine workers in Kentucky have lost their jobs. In Kentucky nine mines are closing, and all have cited the new EPA policies as at least part of the cause for the shutdown. Possible policy solutions include improvement of a program in West Virginia, enacting state policy, and forming a community coalition. In West Virginia, the United Mine Workers Association and WorkForce West Virginia are working together to provide job training for the growing displaced mine workers. The job training program provided by the UMWA and WorkForce West Virginia is funded by a federal grant devoted to efforts in job training. The grant provides up to $5,000 per participant in Classroom Occupational Skills Training, training for occupations expected to be in high demand, such as electrical trades, welding, mechanics, heavy equipment operating, medicine and truck driving. To address the unemployment problem in Kentucky, actions should be taken based off of the program in place by these two groups, though with various changes for improvement.

A Change in the Winds: How the 'Dawgs Can Be Proud of More than Just Sports

Walker Marlatt
Dr. Adel Amer, Religion, Franklin College of Arts & Sciences

It is well known that Athens-Clarke County is poor; by some reports it is the poorest county of its size in the nation. Not surprisingly, its education statistics fall below the state averages. In contrast, the University of Georgia, whose education and rankings have improved drastically over the last few decades, has an incredible supply of funds. This study looks into how it is possible that such a prestigious and high-functioning university exists in such an impoverished city, and what could be done to alleviate that poverty. Since the academics of the university should be its main concern, I focus less on what the university as a whole could do, and more on nonacademic departments, especially athletics. Despite the fact that it owns some of the most valuable property in the city, the university is tax exempt because it is, of course, a university. However, not all of its money goes to places naturally associated with a college education. For example, it spends almost as much (78 percent!) on athletics every year as the entire county does on education. In looking for ways to change this, I gathered information from census data, websites of the various departments of UGA, and local news articles on both UGA and the nature of poverty in Athens. Ultimately, I seek to prove and persuade that the university should pay taxes on its income that doesn't go to improving the life and education of its student body.

Abstracts

Signaling through TNF Receptors during Placental Malaria.

Omar Martinez-Uribe
Dr. Julie Moore, Infectious Diseases, College of Veterinary Medicine

The effects of malarial infection during pregnancy include maternal anemia, low birth weight (LBW), preterm delivery, and increased infant and maternal mortality. Parasites sequester in the placenta and this process is associated with poor birth outcomes, but the mechanisms are still unknown. TNF is a pro-inflammatory cytokine that has been associated with malaria pathogenesis. TNF has a unique ability to induce cell death through its surface receptors, namely TNFR1 and TNFR2. We hypothesize that TNF signaling through its surface receptors (TNFR1 and TNFR2) is required for apoptosis and inflammation followed by tissue damage and pregnancy loss. To verify this hypothesis, we used TNF null-mutant, TNF Receptor 1 Mutant, and TNF Receptor 2 Mutant, as well as wild-type C57BL/6 mice. Mice are infected with *P. chabaudi* AS on day 0 of gestation, and clinical metrics are measured until day 10, day of sacrifice. Spleen, liver, and placental tissue samples are collected and fixed in neutral formalin or fresh frozen in liquid nitrogen. Proteins are isolated and key apoptotic markers such as PARP, caspase 8, RIP1 and cleaved caspase 3 are probed by western blot. Histopathological analysis will also be performed. Preliminary data show that TNFKO and TNFR2 KO are more susceptible to *P. chabaudi* AS infection than B6 mice. Histopathological analysis shows similar features of placental malaria. Continued studies using western blot and immunohistochemistry may unveil new insight into our understanding of the molecular basis of poor pregnancy outcomes in malaria during pregnancy.

The Role of Dopamine in the Perception of Olfactory Inputs in Drosophila Larvae

Melissa Masserant
Dr. Ping Shen, Cellular Biology, Franklin College of Arts & Sciences

When presented with odor inputs, *Drosophila melanogaster* larvae will desire more palatable food; therefore, they will increase the amount they eat. This mechanism requires the neuropil (lateral horn) for higher-order olfactory processing. Higher-order olfactory centers are essential for understanding the motivational significance of the odor inputs. Using *D. melanogaster* in the third instar larval stage, we found a small subset of dopamine neurons along with four neuropeptide F (similar to neuropeptide Y)-producing neurons that project to the larval lateral horns, which mediate the translation from odor signaling to an appetite-driven response. We measure the mouth hook contractions under single odor stimulations to observe the differences in the eating behavior of genetically mutated larvae. However, we are generally subjected to a combination of different odorants; therefore, we primarily focus on how odor combinations affect this mechanism. Our methods also include targeting DA neurons using laser lesion techniques to perform functional analysis studies. Further investigation of this system could lead to a better understanding of anosmia, a major symptom in Parkinson's disease.

The Effect of Order and Condition on Assessments of Executive Function

Brett McCardel, Breanna Ernst, Meghana R. Nathan, Victoria Smith
Bijoyaa Mohapatra, Doctoral Student
Dr. Rebecca Shisler Marshall, Communication Sciences & Special Education, College of Education

Executive functioning is a higher order cognitive ability that enables us to plan, organize, and attend to the stimuli around us. Neurological disorders often present with executive function deficits. A current study in our lab examined executive function in healthy aging individuals. Sixty healthy participants (young=30, aging=30) were evaluated on cognitive tasks that isolate the four fractions of the executive function system. The following tests were administered in a pseudo-random order: Color Trails Test (CTT; set switching), Conner's Continuous Performance Test II (CPT-II; inhibition), Nonverbal N-back Task (updating) and Dual-Task (divided attention). Though these assessments are standard in the literature, ordering and within-test difficulty of these cognitive tests have not been well examined. Due to lack of information in the literature and the potential impact, it is of interest to determine how test order may impact overall executive performance in healthy individuals. It is hypothesized that beginning with a more cognitively demanding test such as the CPT-II will result in poorer performance on subsequent tests. Additionally, analyses of the Dual-Task will be presented; for this Dual-Task, participants were asked to sort cards either by shape, color, or number (three conditions) while simultaneously attending to target sounds played through a computer. It is hypothesized that different conditions may differ in cognitive demands and a less cognitively demanding condition (e.g., sorting by color) may result in better performance scores compared to other conditions. The results of these findings may contribute to a more thorough understanding of test order and presentation for these particular assessments.

Neural Activation Changes Associated with Antisaccade Task Practice

Brett McCardel
Dr. Jennifer McDowell, Psychology, Franklin College of Arts & Sciences

Cognitive control allows us to manage processing of incoming stimuli, and saccade tasks provide valuable insight into how these processes work in the visual system. Prosaccades are rapid, reflexive glances towards a visual stimulus that rely on neural circuitry including visual cortex and frontal and supplementary eye fields. Antisaccades are glances to the mirror location of a stimulus, requiring inhibition of a glance towards the stimulus, thus evoking cognitive control and prefrontal cortex activation. The current study examines the effects of practice on the neural correlates of saccade production when participants perform five runs of varying cognitive load with different probabilities of an antisaccade trial versus a prosaccade trial. Participants will complete a series of eye movement tasks 1) at baseline, 2) during four daily practice sessions, and 3) at post-test. One group of participants will practice five runs with only antisaccade trials while the other group will practice the five probability runs. Functional MRI data collected during the baseline and post-test sessions will be analyzed using an ANOVA to determine the differences in neural activation between the two practice groups using a region of interest (ROI) analysis. It is hypothesized that participants in the antisaccade group will exhibit less neural activation on antisaccade trials at the post-test session compared to the baseline than those in the probability group. These results will help further our understanding of practice-induced plasticity, and how cognitive control

processes are affected by increasing cognitive load.

Arkansas Vaccine Virus Transmitted to SPF Chickens from Vaccinated Broilers Does Not Provide Protection from Challenge

Julia McElreath
Dr. Mark Jackwood, Population Health, College of Veterinary Medicine

Avian Infectious Bronchitis Virus (IBV) is a gamma Coronavirus (CoV) that causes infectious bronchitis (IB), a highly contagious and economically significant upper respiratory tract disease in poultry. All commercial chickens are vaccinated against IBV but the Arkansas-DelMarVa Poultry Industry (Ark-DPI) serotype vaccine has been shown to provide inadequate protection from challenge and persist in a flock. Previous data show that the Ark vaccine follows an atypical replication pattern in comparison to most IBV vaccines, showing late single or multiple replication peaks throughout the life of the bird. This led us to question whether replication peaks were the result of a single infection with multiple replication peaks, or if chickens are being re-infected by vaccine virus shed into the environment. To test this, we placed 200 Ark-DPI vaccinated broilers and 65 non-vaccinated specific pathogenic free (SPF) chickens together in a colony house at 1 day of age. Swabs were taken for 28 days to monitor vaccine virus replication, and on day 30, select birds were challenged with virulent Ark virus. Vaccine replication was not detected in a significant number of broilers until day 24 post-vaccination and SPF chickens until day 28 post vaccination. Following challenge, 14 of 20 SPF and 9 of 20 broiler chickens tested positive for virus by qRT-PCR. This trial again demonstrates poor protection from challenge after Ark-DPI vaccination and that the Ark-DPI vaccine will spread laterally in a flock, indicating that multiple peaks of vaccine replication may be the result of multiple infections of vaccine virus.

Effect of Metformin Treatment on Feline Sarcoma Cancer Cell Cycle and Apoptosis

Laura McLean
Dr. Robert Gogal, Anatomy and Radiology, College of Veterinary Medicine

The hallmark of a metastatic cancer is uncontrolled cellular proliferation followed by cell cluster expansion into the peripheral tissues of the body. Current therapies are designed to block proliferation by directly inducing cell death via direct DNA damage, blocking cell division or impairing cell-signaling events. Still, there is no silver bullet therapy and the typical drug dose needed to achieve cytotoxicity is associated with severe adverse side effects. Metformin is an oral anti-diabetic drug that is used as a first line of defense for human type-2 diabetes with minimal reported side effects. Recent human-based studies have suggested that this drug may also possess anti-neoplastic properties. The focus of this study is to evaluate the cytotoxic effects of Metformin, *in vitro,* using a feline vaccine associated sarcoma cell line. The assays to be performed to assess cytotoxicity include drug inhibition cell proliferation assays, cell viability and apoptosis assays, cell cycle assays and cytology. Preliminary results at this time support that the drug has an inhibitory proliferative effect on the feline sarcoma cell line, which is concentration dependent. Presently, data are being collected on cell viability and apoptosis, cell cycle and cytology under different concentrations of Metformin. Time permitting, we plan to assess the cytotoxic effects of this drug in combination with another conventional antineoplastic drug and report our findings.

Abstracts

Examination of the Pathogenic Nature of *Mycoplasma pneumoniae*

Alison McWhorter Anderson, CURO Honors Scholar
Dr. Duncan Krause, Microbiology, Franklin College of Arts & Sciences

Walking pneumonia is a chronic infection commonly found in young adults and children. The primary cause of this infection is a bacterium known as *Mycoplasma pneumoniae*, which generally infects the ciliated epithelium of the conducting airways. We used Normal Human Bronchial Epithelial (NHBE) cells in an *in vitro* model because they create a mucocilliary barrier comparable to the one that forms in the human airway *in vivo*. Preliminary studies have shown that over time, *M. pneumoniae* will migrate from the apical to the basolateral compartment, which may be important in its ability to cause persistent infections. We infected NHBE cells with *M. pneumoniae* and tracked the course of the infection by examining the ability of the bacteria to pass from the apical surface to the basolateral chamber. This was done in an effort to qualitatively and quantitatively characterize pathogenesis and the ability of the NHBE cells to repair damage following infection. Tests were conducted on both mutant and wild type strains of *M. pneumoniae*. We observed NHBE cell sloughing, which appears to parallel what occurs during natural infections, and conducted immuno-histochemical staining and fluorescence microscopy to localize the mycoplasmas. In addition, we measured bacterial numbers in the apical and basolateral chambers to quantify mycoplasma migration. We also assessed ciliary activity visually by videotaping the movement of fluorescently labeled microbeads of various sizes. We hypothesize that colonization of the basolateral compartment provides the bacteria with a niche for hiding from the immune system.

Effect of Differing Larval Diet on Adult Fitness Measured through Body Size, and Novel Methods for Body Size Quantification in *Drosophila suzukii*

Elijah Mehlferber
Dr. Patricia Moore, Biological Sciences, Franklin College of Arts & Sciences

Drosophila suzukii are a recently introduced invasive species and highly destructive agricultural pest. They pose a unique threat because, unlike their close relative *Drosophila melanogastor*, they do not infest rotting fruit, instead attacking fresh ripening fruit. In this project I studied the relationship between larval diet and adult body size. To investigate this I first had to establish wing length as a viable proxy measurement for mesonotum length, which is the measurement usually associated with body size. I then placed *D. suzukii* eggs on blueberries (low protein diet) and artificial media (high protein diet) and allowed them to develop to adulthood, after which I measured and compared their body sizes. Regardless of which larval diet the flies were raised on, their average adult body size was the same. This indicates that *D. suzukii* have adapted to maximize the utility from a lower protein diet, and their body size may depend more on other nutrients. The preliminary steps in this experiment have yielded a reliable and accurate means to quantify the body size of *D. suzukii*, and this information will be useful for future studies of *D. suzukii* and their various life history traits. The research also allows for a better understanding of the adaptations that *D. suzukii* have undergone in reaction to their unique larval diet, and ongoing research is helping to study other related behavioral effects.

Abstracts

Carbon Flux in the Amundsen Sea Polynya

Jasmin Melara
Dr. Patricia Yager, Marine Sciences, Franklin College of Arts & Sciences

As atmospheric carbon dioxide levels increase from fossil fuel combustion, so increases the importance of the ocean's role of taking up CO2 and sequestering it at depth for centuries to millennia. The Southern Ocean sequesters about 20% of the global ocean drawdown of atmospheric carbon. During the austral summer (December to January), the Amundsen Sea Polynya off of west Antarctica spans an area of 27,000 km2 and is bursting with primary production, which positively correlates with rates of carbon sequestration. The Amundsen Sea Polynya International Research Expedition (ASPIRE) went during this season in 2010-11 to better understand the Polynya and the processes controlling the amount of carbon sequestered in this important ecosystem. The following was measured and calculated from water samples obtained from various locations around the Polynya to calculate the amount of carbon drawdown: dissolved inorganic carbon (DIC), air-sea CO2 flux (GE), particulate organic carbon (POC), dissolved organic carbon (DOC), dissolved organic nitrate (DON), dissolved inorganic nitrate (DIN), and particulate organic nitrate (PON). Two different methods were used to calculate carbon drawdown: a carbon to nitrogen ratio, and this formula ΔDIC + Δgas exchange – (ΔDOC+ΔPOC) = exported carbon. The average drawdown calculated was about 80g C m-2 d -1, a large drawdown compared to the Polynya's size.

Why is There an Alligator in My Pool? Assessing Potential Range Shifts with Sea Level Rise

Lara Mengak, CURO Summer Fellow
Dr. Nathan Nibbelink, Warnell School of Forestry & Natural Resources

Rising sea levels precipitated by climate change threaten southeastern coasts. Models indicate a substantial loss of salt marsh habitat and a transition from current freshwater marsh to saltwater and brackish marsh habitat, which could adversely affect marsh-dependent species, including the American alligator (*Alligator mississipiensis*). Kayak and spotlight surveys were used to determine alligator occupancy across a gradient of saltwater to freshwater marsh sites. Using this occupancy data, we explored the relationship between habitat composition and alligator occurrence. Our results show that the amount of brackish marsh within 250m of a site best discriminated between presence and absence of alligators. Tolerance to salty environments suggests that alligators may be resilient to changing marsh conditions with sea level rise. Preliminary modeling indicates a slight decline in total suitable habitat area, patch size, and habitat permanence. Habitat quality, however, shows a substantial increase. The models suggest that suitable habitat will move further inland due to sea level rise. These potential range shifts may put alligators into increasing contact with humans. Alligators displaced by sea level changes may be forced into new habitats, both natural and human occupied. Additional research on the population status and carrying capacity of important alligator habitat may allow us to better project consequences for both alligators and human communities.

Clicking on Platinum: Copper(I)-Catalyzed Azide-Alkyne Cycloaddition Chemistry for Axial Functionalization of Pt(IV) Prodrugs

Krupa Merchant
Prof. Shanta Dhar, Chemistry, Franklin College of Arts & Sciences

Cis-diamminedichloridoplatinum(II), or cisplatin, is a platinum-based compound that is widely used as a chemotherapeutic for malignant tumors of the cervix, ovaries, testicles, bladder, and lungs. Despite its great curative success, cisplatin can induce a number of toxic side effects, and certain cancers are resistant to cisplatin treatment. Chemical reactions that can manipulate the cisplatin platform will allow researchers to attach different moieties to the drug that may reduce this toxicity and overcome resistance. Cisplatin, with all coordination sites occupied by –amine and –chloro ligands to perform its anticancer activity, does not offer any vacant site to perform such attachment. However, octahedral Pt(IV) analogues can provide an additional two axial sites for such kind of reactivity. Pt(IV) compounds are known as prodrugs because of their ability to undergo reduction by biological reducing agents to produce cisplatin, the active drug. One type of chemistry that can be very useful in introducing new functionality onto platinum is "click chemistry." These types of reactions are usually 100% efficient and leave very few by-products. In this poster, we will discuss copper(I)-catalyzed azide-alkyne cycloaddition chemistry for axial functionalization of Pt(IV) prodrugs.

Generation of Transgenic Plants Carrying Promoter: Reporter-Gene Constructs to Investigate Transcriptional Expression of GAUT Genes in Arabidopsis

Swayamdipto Misra, Ramsey Scholar
Dr. Debra Mohnen, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Pectin is a family of highly complex polysaccharides that serve as important substituents of the plant cell wall and have important functions in cell-to-cell adhesion and plant development and defense. A comprehensive understanding of how pectin is synthesized will have important potential applications in crop enhancement and in better utilization of biomass for biofuels. It is known that the GAUT gene family, with 15 members in Arabidopsis, is involved in pectin synthesis, yet the function of these genes is not yet fully understood. This project aims to investigate the transcriptional expression of individual GAUT genes in different tissues or developmental stages of Arabidopsis plants by using reporter gene constructs driven by GAUT gene promoters. Over the past two semesters, β-glucuronidase (GUS) reporter gene constructs were created for several of the GAUT genes, including GAUTs 3, 5, 9, 10, 13, and 15. The promoter regions of the GAUT genes were amplified by Polymerase Chain Reaction (PCR), inserted into cloning vector pGEM-T, and verified by DNA sequencing. These promoter sequences were subsequently moved into the plant expression vector pBI101 in front of the GUS gene. The resulting constructs were introduced into Arabidopsis plants through *Agrobacterium*-mediated transformation. The seeds from the plants were grown and screened for positively transformed plants. The second generation resulting from these plants will be analyzed and stained in order to study the expression of the respective GAUT genes. Using a similar procedure, a Green Fluorescent Protein

(GFP) reporter-gene construct was also generated for GAUT 1.

Fiber Isotype Post-Injury in Secondary Dystroglycanopathies
Jill Modi, CURO Graduation Distinction
Dr. Aaron Beedle, Pharmaceutical & Biomedical Sciences, College of Pharmacy

Loss of α-dystroglycan (αDG) glycosylation by mutations in *Fktn* causes muscular dystrophy. As severe *Fktn* deficiency has been linked to abnormal skeletal muscle regeneration and differentiation processes, we hypothesized that differentiated skeletal muscle fiber isotypes may arise at different proportions in *Fktn*-muscular dystrophy (KO, *Fktn* knockout mice) compared to normal controls. Cardiotoxin was injected into *Fktn* KO and littermate mice to create acute muscle damage. The resulting muscle fiber differentiation was analyzed 14 days after injury by measuring the proportion of immature and mature isotypes of the myosin heavy chain protein (MyHC) using immunofluorescent microscopy. We found that KO muscles retain more immature MyHC than littermates 14 days after injury, suggesting that regeneration/differentiation is slower in *Fktn* muscular dystrophy. Additional analysis of mature fiber types is ongoing. Overall, changes in KO muscle regeneration and differentiation may provide clues about the molecular events underlying muscle pathology in *Fktn* muscular dystrophy.

VacSIM, a New Vaccine Delivery Method, Improves Cellular Recruitment to Local Draining Lymph Nodes
Joshika Money
Dr. Donald Harn, Infectious Diseases, College of Veterinary Medicine

Although vaccines are a highly effective method of disease prevention, more effective vaccines are needed to increase vaccine efficacy in immune-compromised populations, such as the elderly and very young children. The Harn Laboratory developed an improved method of vaccine delivery, VacSIM (Vaccine Self-Assembling Immune Matrix) that increases vaccine efficacy. The goal of this research project is to gain a better understanding of the method of vaccine delivery used by VacSIM. Three groups of mice were utilized in this experiment; one group was injected subcutaneously with VacSIM, one group was injected with VacSIM and CpG adjuvant, and the last group was unvaccinated. Draining and non-draining lymph nodes were analyzed 24 and 48 hours after injection. Upon analysis, it was found that with VacSIM alone, cell numbers in draining lymph nodes do not increase significantly, but with the addition of CpG adjuvant, cell numbers do increase in the draining lymph nodes. This demonstrates that VacSIM does not create an immune response, allowing the CpG to activate the immune system normally. Thus, VacSIM has been shown to be a viable method of vaccine delivery that does not activate an immune response on its own. VacSIM can therefore be used to safely administer vaccines more efficiently, especially in immune-compromised populations.

Balancing Carbon and Phosphorus for Consumers: Does Nutrient Enrichment Tip the Scale?
Timothy Montgomery
Dr. Amy Rosemond, Odum School of Ecology

Forest stream food webs are based on organisms that can photosynthesize (autotrophs) as well as those that break down terrestrially-derived detritus (heterotrophs). Heterotrophic processes dominate carbon flow in forested streams; however, autotrophic processes may become more important in response to human activities such as nutrient loading. Nutrient loading can affect growth and nutrient

content (lower carbon: nutrient ratios) of autotrophs, which can affect growth of consumers and ecosystem nutrient retention. However, few studies have quantified the effects of nitrogen (N) and phosphorus (P) in changing nutrient content of autotrophic biofilms in streams or assessed how much biofilms change on natural substrates (rocks) vs. standardized substrates (tiles). We compared biofilms on standardized and natural substrates in five headwater streams that were enriched with five concentrations and ratios of N to P for two years (N:P = 2:1, 8:1, 16:1, 32:1, and 128:1). Biofilm ash-free dry mass (AFDM) and C:N:P stoichiometry were quantified and compared. Our results suggest that nutrient enrichment increased cobble biofilm AFDM by 47%. The cobble C:P decreased by 30% respectively across all streams, possibly shifting the limiting nutrient of the streams from P. Tile biofilms were 1.5-2x higher in C:P and N:P compared to cobble biofilms, while cobble biofilms were 8x higher in terms of AFDM. Overall, these results suggest that nutrient enrichment increases biofilm AFDM and nutrient content, but the degree to which was underestimated with standardized substrates.

Analysis of International Media Coverage of Key North Korean Military Events

Cecilia Moore, Holly Boggs
Dr. Brock Tessman, International Affairs, School of Public & International Affairs

Ultimately, the foreign policy behavior of a state is based on its subjective judgments about the intentions and behavior of another state. Often, media coverage can drive these subjective judgments. In this paper, we analyze international media coverage of key military events in the Democratic People's Republic of Korea (DPRK) in order to better understand the impact of media outlets on the major countries involved. We conduct a thorough content analysis of editorials from major newspapers in the People's Republic of China (PRC), Republic of Korea (ROK), Japan, and the United States (US) on two rocket and two nuclear tests conducted by the DPRK from 2009-2013. We analyze editorials immediately preceding and following the tests and draw from newspapers that represent a diversity of political ideology within each country. Using statistical means of analysis, we will test our hypotheses, which are that the nuclear tests will be covered more frequently and more negatively than the rocket tests, all right-leaning newspapers will cover the events more frequently and more negatively than the left-leaning papers, and newspapers in the ROK and Japan will have significantly more frequent and negative coverage than newspapers in the US or PRC. Our findings can be applied to future research concerning these four countries' foreign policy decisions regarding the DPRK. This might indicate a correlation between the tone and frequency of the countries' media coverage and their foreign policy decisions.

EnVISIONeD: Examining VISion among Inpatients with Diabetes

Victoria Moreira
Dr. Valerie Press, University of Chicago Medical Center

Diabetes Mellitus (DM) is the leading cause of blindness among adults in the US. However, patients often fail to obtain vision screening in the outpatient setting due to a myriad of patient and provider factors. There are also limited data for analyzing the hospital inpatient setting as a place to provide guideline recommended care to patients before discharge. Therefore, the present pilot study aimed to evaluate the prevalence of poor vision among inpatients with DM compared to the general medicine population. The study also sought to understand how to catch missed opportunities and to improve inpatient access to guideline recommended diabetic vision care. It was hypothesized that patients with DM would have a significantly

higher prevalence of poor vision. Vision was measured by a bedside Snellen eye chart test and data assessing characteristics of poor vision were also collected. It was found that participants with diabetes were more likely than those without diabetes to have insufficient vision (74/239, 31% vs. 101/466, 22%; p=0.007). As this is a pilot study, data collection is ongoing. However, these findings highlight the importance of utilizing other settings to catch missed opportunities for patients – especially those with DM at risk for developing severe comorbidities. Future studies should continue to evaluate this topic in a multi-site study to enhance the generalizability of results.

Investigation of Hand-Tool Mastery in Tufted Capuchins Using a Multiple-Jointed Tool

Jake Moskowitz, Amanda Heaton, Joshua Lukemire, Stephanie Villarreal
Dr. Kathy Simpson, Kinesiology, College of Education
Dr. Dorothy Fragaszy, Psychology, Franklin College of Arts & Sciences

Using a hand tool effectively requires positioning it and applying appropriate force with it on the target object or substrate. The motor control strategies and spatial reasoning supporting tool use by nonhuman primates likely differ from those of humans, but the nature of the differences is unknown. Capuchin monkeys are the only genus of New World monkeys that spontaneously and regularly use hand tools. We report on an ongoing comparative investigation into how capuchins and chimpanzees use hand tools. Four individual capuchins in the Fragaszy laboratory at UGA were recorded individually using a rake tool to retrieve a token. Monkeys used the tool for 100 trials with a rigid handle, then 100 trials with one joint in it, and finally 100 trials with two joints (in orthogonal planes). In a second phase, they used the tool with the order of tool conditions varied randomly, and a new position for the blade of the rake included randomly. Four cameras placed at different angles recorded the monkey's actions with the tool. We are analyzing the monkeys' actions using ethological and kinematic methods. The findings will help us to understand how monkeys manage variable numbers of degrees of freedom in the tool and also contribute to resolving the theoretical debate surrounding the basis for variability across species in tool use. Supported by grant HD-060563 from the NIH.

Evidence for Indirect Effects of a Predatory Fish on the Size Distribution and Behavior of a Larval Caddisfly Species in Trinidadian Streams

Kelly Murray, CURO Summer Fellow
Dr. Catherine Pringle, Odum School of Ecology

It is important to understand both the direct and *indirect* effects of predators on their prey, given the cascading effects that can result from predator-prey interactions. Previous studies in Trinidadian streams indicate that an important prey item of killifish (*Anablepsoides hartii*) is larvae of the leaf-shredding caddisfly, *Phylloicus hansoni* (Trichoptera: Calamoceratidae). Since larval *Phylloicus* have been found to play a key role in controlling rates of leaf decomposition in Trinidadian streams, predator-mediated effects on *Phylloicus* are important to understand. *Phylloicus* occurs at significantly lower abundances in headwater streams dominated by high densities of killifish, relative to downstream reaches (below barrier waterfalls), where killifish are at lower densities and co-occur with guppies (*Poecilia reticulata*). These previous findings strongly suggest that high densities of killifish in upstream reaches exert *direct* top-down control on *Phylloicus* abundance. In this study, we examine potential *indirect* effects of killifish on *Phylloicus* size frequency distribution and behavior.

Analysis of size frequency distributions of larval *Phylloicus* from both killifish only (KO) reaches and killifish+guppy (KG) reaches (n=5 of each reach type) confirmed our prediction that different predation pressure by killifish alter the size structure of *Phylloicus* larvae: KO reaches exhibited a size frequency peak at a smaller size than in KG reaches. When exposed to killifish cues in *ex situ* laboratory studies, the leaf-shredding activity of larval *Phylloicus* from KO reaches was much greater than that of larvae from KG reaches. Therefore, predation pressure is likely important in shaping behavior and population characteristics of a dominant shredder species.

Analysis of Cancer Mutations in Protein Kinases Using Semantic Web Technologies

Anish Narayanan, CURO Summer Fellow
Dr. Natarajan Kannan, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Protein kinases are critical cell regulators, serving as initiators of signal transduction pathways and coordinators of cellular processes through the phosphorylation of target molecules. Given the importance of kinases in ensuring proper cell growth and development, the analysis of misregulatory kinase mutations is a hot target of cancer research. Despite the wealth of online kinase data compiled from various high throughput studies, previous computational approaches were limited due to the specialized nature of databases such as UniProt, COSMIC, and Reactome. To solve this daunting challenge of data integrability, our lab designed the Protein Kinase Ontology (ProKinO). This study utilizes ProKinO's unique sequence alignment of kinase mutations to PKA to generate heatmaps which identify mutation cooccurrence events. Oncogenic cooccurrences were found to be prevalent between two essential kinase subdomains: the glycine-rich loop that coordinates with ATP and the activation loop that interacts with the substrate. The biological effect of these tandem mutations was then evaluated by employing a data-mining approach. Applying natural language processing to the literature from Pubmed's Open Access Subset, mutations were labeled as having positive, negative, or neutral impact. Additionally, the type of impact was curated as either affecting phosphorylation activity, modulating resistance to kinase inhibitors, or altering substrate binding efficiency given computer-identified impact statements. This technique, in conjunction with crystal structure data, will be extended to develop a machine learning approach that accurately predicts the effects of novel kinase mutations. This will be of tremendous value in identifying personalized cancer treatments given patient genomes.

The DIY Phenomenon: Why We "Do It Ourselves"

Lindsay Nation
Dr. Katalin Medvedev, Textiles, Merchandising & Interiors, College of Family & Consumer Sciences

The phenomenon of "DIY" or "do it yourself" refers to the lifestyle trend of self-sufficiency. This trend has had an effect on many industries, including the apparel industry. My paper investigates the economic, political, social, and psychological factors that have created the current DIY culture and its effects on dress production globally and locally. My research concluded that DIY tends to be popular in times of low economic prosperity and political unrest. The analysis of the social and psychological underpinnings of this trend also revealed that the main demographic that currently controls this trend is predominately upper-middle class white Americans, mostly women ages 15-50, who have a lot of leisure time and resources to look "different" and make things for themselves at their own pace. These

characteristics of the DIY trend are important for apparel companies, especially for local businesses. However, unless there are serious resource shortages, the global market will continue to be a mass merchandise market and DIY will likely have little effect on it. Despite this, DIY is a significant current trend; therefore, fashion industry leaders who are eager to predict the actions and preferences of consumers are closely watching it.

ChuW as a Class C Radical SAM Methyl Transferase

Anudeep Neelam
Dr. William Lanzilotta, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Iron is an essential metal for both pathogenic and symbiotic bacteria, and acquisition of iron can become a challenge during host colonization. Organisms can utilize heme and heme-containing proteins of the host as a source for iron. Located on a heme utilization operon and expressed under iron duress, ChuW from *Escherichia coli* O157:H7 is currently annotated as an oxygen-independent coproporphyrinogen III oxidase due to its additional "HemN-like" domain located on the C-terminus. However, HutW, a ChuW homologue, does not rescue a HemN mutant from *S. enterica*, and sequence analysis suggests similarities to class C radical SAM methyl transferases (RSMTs). Like HemN, ChuW may contain two SAM binding sites along with a [4Fe-4S]2+/+, which aids in radical generation and methylation. The structure and mechanism for Class C RSMTs have yet to be elucidated. In this work, we show ChuW contains an Iron-sulfur cluster and produces equivalent amounts of 5'-deoxyadenosine and S-adenosylhomocysteine, in the presence of an electron source, SAM, and Fe(II)-Deuteroporphyrin IX. In attempts to disrupt ligand binding and/or trap an intermediate, a predicted model of ChuW, derived from HemN, was generated to provide us with the amino acid targets for site-directed mutagenesis. By using EPR, UV-vis spectroscopies, and HPLC, we have characterized the variants Y61R and F76A, both of which displayed a bound iron-sulfur cluster; however, only the F76A expressed activity. ChuW is the first class C RSMT reported, hence, this research will help further our understanding of the mechanism of this subfamily of radical SAM enzymes.

"Please Excuse Me as I Am in Need:" Bondage and Freedom in Civil War-Era Athens

Laura Nelson
Dr. Christopher Lawton, History, Franklin College of Arts & Sciences

Studying the lives of slaves challenges outmoded, monolithic mythologies of the past and instead recognizes the enormous struggles and equal contributions of both black and white Americans. This research does so by reconstructing and examining the life of Aggy Mills (1827-1900), an Athenian woman enslaved by the elite Cobb family. She was remarkably literate, and through several extraordinary letters that she wrote to her owners, aspects of her life in slavery and freedom, like her role in her master's home and her place in the multicultural Athenian community, become apparent. Trace details of her life were first seen in these letters, but these only recount a portion of her life. To see Aggy as more than a servant, these letters are examined in conjunction with sources in the Athens-Clarke County Heritage Room, property deeds at the courthouse, census records, and various other local sources. Studying Aggy's life helps to give a more multifaceted version of the antebellum South, one where slaves' and whites' lives were intertwined, and slaves managed to define their own lives outside of the realm of their bondage. This research has been transformed into a digital sketch of Aggy's life as a part of

the Georgia Virtual History Project. Viewers can hear Aggy's story and see the places connected to her life via a downloadable app for smartphone or tablet. Additionally, this research will be presented at the annual conference of the Georgia Association of Historians.

Work-Sites with Physical Exercise Facilities and Their Effect on Employee BMI and Waist Circumference

Christina Nguyen
Dr. Jennifer Gay, Health Promotion & Behavior, College Of Public Health

Work-sites that provide employees with places to be physically active and allot a longer break period for physical activity may see an increase in the overall health of employees. We hypothesize that work-sites that offer onsite fitness centers and fitness rooms and have policies that support physical activities will be associated with a decrease in BMI and waist circumference of employees. Information was gathered about the work-sites using the Environmental Assessment Tool (EAT), such as offered time for physical activity during work hours, the presence of fitness equipment and walking routes and trails at work sites. Approximately two hundred employees had their weight and height measured to calculate their BMIs and waist circumferences. Average BMIs, average waist circumferences and frequency of employees that have access to physical activity programs will be calculated. T-tests will be calculated for BMIs and waist circumferences comparing employees at work-sites that have physical activities programs versus work-sites that do not have these programs. The importance of this research is to provide employers with data that would increase the overall health and productivity of their employees. Additionally, it would allow employers to determine if existing or planned exercise facilities are cost effective.

Metaphors of Color: The Linguistics of Internalized Racism

Minh Ngoc Nguyen
Dr. Chad Howe, Romance Languages, Franklin College of Arts & Sciences

This study proposes a history of the English word *whitewashed* based on quantitative and qualitative evidence from historical and modern language corpora. Analyzing the change from the word's original meaning to its racially imbued meanings, the paper also examines *whitewashed* as it pertains to the Vietnamese-American community in the context of other racially charged words and phrases (i.e. FOB, *fobby, fresh off the boat, acting white*). Based on the qualitative analysis, the data suggest that *whitewashed*, while particularly similar to the phrase *acting white*, retains a negative racial connotation that differs from the other expressions. This study explores the evolution of social meaning through the intersection of racial stereotypes and lexical semantic change.

Mitogen Activated Protein Kinase Flanking C-Terminal Tail: Structure and Function

Tuan Nguyen, CURO Honors Scholar, Ramsey Scholar, CURO Summer Fellow
Dr. Natarajan Kannan, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Living cells use networks of mitogen activated protein kinase (MAPK), a key cellular component of signal transduction, to respond to environmental signals. MAPK's cellular significance is underscored by its having been implicated in among the most prevalent aberrant signalling pathways in cancer. Although members of MAPK family have been extensively characterized at the biochemical, cellular, and structural level, an integrated evolutionary understanding of MAPK's functional divergence from a sequence level has been inadequate. Here, I

discuss how using genomic sequence comparison tools has shed light upon MAPK's structural evolution. I present evidence for co-evolution between MAPK's catalytic domain and MAPK's unique flanking C-terminal segment. Further implications of this work will be made in the talk.

Effects of Patellar Tendon Strapping on Lower-Extremity Kinematics

Pete Nkengasong
Dr. Cathleen Brown Crowell, Kinesiology, College of Education

Patellar tendinopathy is a musculoskeletal overuse injury, and treatments attempt to reduce pain by applying strap devices around the tendon. The mechanism causing pain reduction is not known, but using strapping may alter lower extremity kinematics of the ankle, knee, and hip in the sagittal plane. The purpose of this study is to determine the acute effect of patellar tendon straps on ankle, knee, and hip peak flexion angle during a drop jump with and without a Matt strap. We hypothesized that knee joint flexion would increase with strapping. Twenty-three recreationally active participants (14 females, 9 males, age=21.6 ± 3.5 years, height=174.2 ± 8.3 cm, mass=70.8 ± 10.9 kg) who experienced patellar tendon pain were fitted with 16 retro reflective markers, and data were collected via a 7-camera Vicon motion capture system. Participants performed a two-legged drop jump (DJ) off a 40cm box, landed on a force plate, and immediately jumped 50% of their maximum vertical jump. Five trials were performed with and without the Matt strap in a counterbalanced order. Paired sample t-tests ($p < .05$) were used to compare differences in peak flexion angles of the hip, knee, and ankle between strapping conditions. There were no significant differences in strap versus no-strap conditions, respectively, at the ankle (35.5 ± 10.1°, 34.6±8.6°, $p=0.52$), knee (76.3±13.3°, 74.0±13.6°, $p = .10$), or hip (58.1±11.7, 57.7±14.1°, $p=.74$). Acutely applying a strap appeared to have no influence on peak flexion angle in any lower extremity joint. Pain reduction may be caused by another mechanism.

***In Vitro* Protease Digestion and Reduction of Tropomyosin using Shrimp and Tropomyosin-Enriched Samples**

Kristyn Nock
Dr. Yao-Wen Huang, Food Science & Technology, College of Agricultural & Environmental Sciences

Of the vast range of foods responsible for adverse allergic reactions, crustaceans have been and continue to be a growing concern. The reaction caused by the consumption of crustaceans is IgE mediated, as IgE antibodies bind to the food allergen and induce a release of potent compounds, triggering symptoms of allergic reactions such as anaphylaxis, angioedema and morbilliform rashes. This study focuses on determining the most effective protease and conditions for reduction of the allergenicity of tropomyosin, the primary allergen responsible for adverse reactions from the ingestion of crustaceans. To reduce its allergenic activity, the goal of this study was to degrade tropomyosin into peptide fragments through protease digestion. Tropomyosin enriched samples and masticated shrimp samples were treated with either trypsin or α-chymotrypsin in simulated gastric fluid. Two methods of digestion were performed using a water bath and a gastrointestinal simulator. Hydrolysates were collected at various digestion times and samples were subjected to sulfate polyacrylamide gel electrophoresis (SDS-PAGE) to analyze alterations in the molecular weight of tropomyosin. The western blot method was additionally performed for further analysis of the degree of allergen reduction for particular digested samples. From multiple variable alterations throughout successive trials, the proteolytic ability of trypsin on tropomyosin at a 1:25 enzyme-

protein ratio was indicated. Upon expansion of this knowledge, it may be possible to incorporate the protease into crustacean-containing foods so that they may be nonallergenic and safe for consumption.

Hydrothermal Synthesis and Particle Size Study of Ancient Pigments

Isaiah Norris
Dr. Tina Salguero, Chemistry, Franklin College of Arts & Sciences

Egyptian Blue, $CaCuSi_4O_{10}$, and Han Blue, $BaCuSi_4O_{10}$, are among the first synthetically manufactured inorganic pigments from the ancient world. These two pigments are most notable for their vibrant blue hues that were used to color paintings. Modern interest in these pigments is due to their strong emission in the near infrared. Conventional solid state reactions for these pigments need extremely high temperatures of 950-1050 °C. We are developing two new ways to synthesize both pigments: hydrothermal and solid state with nanomaterials. The hydrothermal synthesis takes place in a Teflon-lined autoclave using water as a solvent and reduces the reaction temperature to 250 ºC. Future work with this method will be a time study of crystal size. We are also working on a study of what effect the size of starting materials has on the size, reaction temperature, and morphology of the product in solid state reactions of these two pigments by using scanning electronic microscopy to confirm particle size. We have found that when two of the starting materials are nanoparticles and the third micoparticles, the resulting product is reduced in size compared to the bulk synthesis using non-nanomaterials and has a decreased reaction temperature. Future work for this project will be to use all nanosize starting materials to see how small the product will be and how much of a reduction in reaction temperature we can obtain.

Proteomic Analysis of Erythrocyte Ghosts: The Effects of Zinc Supplementation

Kathleen Norris, CURO Graduation Distinction
Dr. Arthur Grider, Foods & Nutrition, College of Family & Consumer Sciences

Measuring plasma/serum zinc concentrations is used as a biomarker for assessing zinc status in human populations, but is neither sensitive nor specific for assessing individual zinc status. The purpose of this research is to identify zinc-responsive proteins within the erythrocyte membrane. Blood was collected as part of a larger study assessing the effects of 24 mg zinc supplementation for 4 weeks on bone growth biomarkers in Caucasian early adolescent females (9-13 years old) (PI: Richard Lewis). Samples were collected at baseline ($n=21$) and at 4 weeks ($n=20$), and plasma and erythrocyte ghosts (EG) prepared. Plasma zinc concentrations were measured by atomic absorption spectroscopy. EG proteins were separated by two-dimensional gel electrophoresis (2DE; isoelectric focusing (pH 3-10) and 10% denaturing polyacrylamide electrophoresis). The gels were stained with colloidal Coomassie blue, the images digitized, and densitometry was performed. Significance ($p \leq 0.05$) was determined using Student t-test. The plasma zinc concentration increased 1.2-fold $\pm$ 0.4(SD) after the four-week period of supplementation ($p<0.05$). Two EG samples from baseline and 5 EG samples from 4-week zinc supplementation were separated by 2DE. Three proteins exhibited zinc-dependent differential expression: 81.3 kDa, ~ pH 10 (1.7-fold increase); 45.7 kDa, ~ pH 7 (2.7-fold increase); and 134.9 kDa, ~ pH 6 (3.6-fold increase). These data support the up-regulation of certain proteins within the erythrocyte membrane in response to zinc supplementation. These proteins may ultimately serve as biomarkers for assessing individual zinc status following further validation.

Abstracts

Economic Transition and Psychological Distress as it Relates to Risk Factors for Cardiovascular Disease in St. Lucia

Mary Elizabeth Nuttall, CURO Honors Scholar
Dr. Colleen O'Brien Cherry, Global Health, College of Public Health

St. Lucia, a small island country in the Caribbean, has transitioned from an agrarian to a tourism-based economy. This economic transition has caused many socio-cultural changes, including an increase in psychological distress for much of the population as livelihoods change and the cost of living increases. Psychological distress is hypothesized to shape lifestyle behaviors, such as over-eating and alcohol consumption, both of which increase the risk for cardiovascular disease (CVD). Our research focuses on understanding the causes and outcomes of psychological distress and its effect on risk factors for heart disease in St. Lucia. After obtaining informed consent, we conducted informal one-on-one interviews with 25 participants concerning their cultural perceptions of CVD and its lifestyle risk factors. Using the themes uncovered in these interviews, we conducted 4 focus groups using photovoice, a method in which participants explained photographs reflecting their perceptions of health. An in-depth analysis of the interviews and focus groups is underway using NVivo software. Preliminary analysis indicates that economic pressures and family responsibilities are the two major causes of psychological distress that participants face. Additionally, we found that many participants cope with psychological distress by over-eating and drinking to excess. Few projects focus on the association between the risk factors for heart disease and psychological distress in St. Lucia and other middle-income countries undergoing similar economic transitions. Our research will provide a unique perspective on a growing global issue and ultimately could be used to stage culturally relevant CVD intervention programs focused on managing psychological distress.

Max Contracts: Savings or Reallocation?

Thomas Oliver
Dr. William Vogt, Economics, Terry College of Business

This essay argues that the maximum limit imposed on individual player salaries by the National Basketball Association's collective bargaining agreement in 1999 created an environment in the free agent market that led organizations to adopt a more inefficient spending style than the one employed in the era before the policy was in place. Specifically, the individual player salary cap resulted, in the first years after its imposition, in a transfer of salary from the best players to intermediate skill players, and, in more recent years, from the best players to lower skill players. Skill was measured with win shares, a standard basketball player performance metric. Data on contracts and win shares were collected for the 1995/6 through 2013/14 seasons. Since player contracts are typically multi-year and since aging has large effects on performance, it was necessary to forecast each player's future performance over the life of his contract based on age and past performance. This projected win share was the key player quality measure. Contract values were plotted against projected win shares both before and after the imposition of the individual salary cap policy and loess regression was run to confirm the graphical results. These results show that the relationship between salary and player quality became noticeably less steep and less convex immediately after the imposition of the cap, with intermediate quality players benefiting from the change. In more recent years, lower quality players appear to have benefited more from the salary cap, as a more convex relationship reasserts itself.

Abstracts

Analysis of P1 Function in *Mycoplasma pneumoniae* Adherence and Gliding

Babajide Oluwadare, CURO Honors Scholar, CURO Summer Fellow
Dr. Duncan Krause, Microbiology, Franklin College of Arts & Sciences

This study focuses on *Mycoplasma pneumoniae*, a human pathogen causing bronchitis and primary atypical, or "walking" pneumonia. Mycoplasma adherence to respiratory epithelium is mediated by a differentiated terminal organelle. Located on the surface of the terminal organelle is the P1 protein, which functions directly in both cell adherence and motility. There is evidence from recent studies to indicate that P1 repeatedly catches and releases sialic acids, present on airway cell surfaces, to thrust the mycoplasma cell forward. Furthermore, P1 is believed to exist in conformationally distinct subpopulations that shift when mycoplasma cells glide. Little is known about the specific mechanism by which the bacterium exhibits motility via the P1 protein. Learning about this unique form of movement can lead to new strategies for treatment of infections and a greater understanding of bacterial motility. By means of immunofluorescence microscopy with monoclonal antibodies specific for P1, mAB1 and mAB2, we sought to define quantitatively the location and relative amounts of P1 subpopulations. The antibodies mAB1 and mAB2 consistently yielded distinct labelling patterns, which were not the result of background or "noise." Furthermore, mAB1 appeared to bind only to a subset of P1 proteins and only at specific times, as opposed to mAB2, which appeared to bind to all P1 at all times.

Use of Synthetic AKAP Peptides to Assess the Importance of the Protein Kinase A Signaling in the African Trypanosome

Nina Paletta
Prof. Kojo Mensa-Wilmot, Cellular Biology, Franklin College of Arts & Sciences

Human African Trypanosomiasis (HAT) is a tropical disease caused by the protozoan parasite *Trypanosoma brucei*. Over 70 million people are at risk of contracting HAT, and current drug treatments can be highly toxic. Evolutionarily diverged cell cycle regulators may be promising targets for anti-trypanosome discovery. A-Kinase Anchoring Proteins (AKAPs) contribute specificity to cyclic-AMP signaling by protein kinase A (PKA) through binding the enzyme and its substrate targets. We are testing the efficacy of human AKAP-inhibitor peptides against *T. brucei*. These peptides are hypothesized to disrupt AKAP scaffolding, thus perturbing PKA signaling. We are taking three approaches to achieve our goals: 1) identify AKAP binding proteins, by immunoprecipitation, 2) localize AKAP binding proteins by fluorescence microscopy, and 3) determine antitrypanosomal properties of the AKAP inhibitor by flow cytometry. We treated trypanosomes with an AKAP inhibitor modified with a biotin label. After treatment, trypanosomes were lysed and passed through a streptavidin-coated bead column. A set of trypanosome proteins bound the AKAP peptide (as determined by SDS-PAGE). These proteins will be isolated from the gel and identified by mass spectrometry. The microscopy and flow cytometry experiments are currently underway. By analyzing the data from all three assays, we can better understand the contributions of AKAP scaffolding and PKA signaling in the trypanosome.

Abstracts

Bioluminescent Color Shifts in North American Fireflies

Jennifer Pallansch, CURO Summer Fellow
Dr. David Hall, Genetics, Franklin College of Arts & Sciences

A frequently overlooked feature of firefly light signaling is the natural color variation observed across species. This project documented extensive bioluminescent color variation among North American fireflies to expand upon current field data and to elucidate possible correlations between color shifts and environmental factors. Firefly emission spectra were recorded for over 600 individuals at 52 field sites. The use of a portable spectrometer minimized potentially modulating factors such as age and the effects of chemically induced flashing by capturing emission spectra in a natural setting. With this data, we tested environmental factors for associations. Because it has been theorized that color shifts are influenced by ambient light, each population was categorized by habitat and activity time to estimate the amount of background light in the environment. Habitat and activity time designations were compared with color shifts across all species data as well as population data collected from two main species, *Photinus pyralis* and *Photinus scintillans.* Statistically significant associations were not observed with activity times, but habitat showed significant correlations with both species and *P. scintillans* spectral data. By collecting comprehensive field data, we were able to examine several environmental factors possibly involved in the evolution of color shifts and provide an in-depth assessment of naturally occurring color variation in fireflies.

Exploring the Variable Weaning Strategies of Female Rhesus Macaques through Stable Isotope Biochemistry

Katherine Partrick, CURO Summer Fellow
Dr. Laurie Reitsema, Anthropology, Franklin College of Arts & Sciences

Weaning is an important life history phase because it directly affects a mother's fitness and infant development. Observational data traditionally used to assess weaning age can be imprecise due to the problems of comfort nursing and nursing at night. We employ an isotopic approach to more objectively assess age-at-weaning of captive rhesus macaques (*Macaca mulatta)*. We also examine factors thought to influence weaning strategies, including mother's rank, infant sex, and infant growth rate. We test two alternate hypotheses: (1) Infants are weaned at age 5 months (based on previous observations on captive *M. mulatta*) and (2) infants are weaned upon reaching 2/3 adult body size: ages X-Y months (the threshold weight hypothesis). Stable carbon and nitrogen isotope data were assayed from blood plasma of 8 mother-infant pairs of known age, rank, parity and weight housed at the Yerkes Primate Research Center. Mothers were sampled at ages 2 and 5 months. Infants were sampled at ages 2, 5-8, and 10 months. Mean values of the mothers over 10 months were δ13C=-19.3$\pm$0.37‰ and δ15N=6.9$\pm$0.3‰. Between 2 and 10 months, infant δ15N values dropped from 7.7$\pm$0.3‰ to 6.8$\pm$0.3‰, and δ13C values dropped from -18.0$\pm$0.28‰ to -19.9$\pm$0.44‰. Males were weaned earlier than females (age 6 months versus age 8 months). No relationship was found between isotopic values and infant growth rate or maternal rank, although the lowest ranking mother weaned her offspring earliest. The refined snapshots of weaning status obtained through isotopic analysis permit previously impossible hypothesis testing in primate weaning ecology.

Recombinant Protein Therapy: Generation and Purification of Various Fukutins

Niraj Patel
Dr. Aaron Beedle, Pharmaceutical & Biomedical Sciences, College of Pharmacy

Protein therapy is a method of delivering therapeutic amounts of protein that would be otherwise absent or insufficient in individuals that have a disease. Because the loss of functional fukutin (Fktn) causes Fukuyama Congenital Muscular Dystrophy (FCMD), we seek to determine whether protein therapy can alleviate the disease temporarily. To test this question, we designed and generated various fukutin inserts (Tat-mini-Fktn, full-length Fktn, and Tat-full-length-Fktn) in the pET29a expression plasmid for recombinant protein expression. The Tat (Trans-Activator of Transcription) sequence was fused to several of the fukutin inserts because it has cell penetrating peptide properties, to promote cell entry. We then induced synthesis of the fukutin recombinant proteins in bacteria. Recombinant protein is purified and then tested in mice with fukutin-deficient muscular dystrophy. We aim to determine the localization, stability and potential therapeutic activity of the different fukutin protein variants in mouse skeletal muscle. Overall, these studies will help us to understand the function and activity of fukutin and its potential for therapeutic benefit.

Role of Salicylic Acid in Oxidative Stress Responses in *Arabidopsis thaliana*

Shreya Patel
Dr. C.J. Tsai, Genetics, Franklin College of Arts & Sciences

Plants are sessile organisms and face biotic and abiotic stress during their life cycles. As such, they have developed an inherent ability to survive unfavorable conditions through defense mechanisms. Salicylic acid (SA) is a phytohormone that is ubiquitously expressed in plants and is thought to play an important role in oxidative stress responses. We used transgenic *Arabidopsis thaliana* lines that exhibit varying levels of salicylic acid to assess its effects on oxidative heat response. Oxidative damage in plants involves oxidation of polyunsaturated fatty acid molecules in the lipid bilayer of the cell membrane and can be measured by the thiobarbituric acid-reactive substances (TBARS) assay, using malondialdehyde as the substrate. Known as the secondary end product of polyunsaturated fatty acid oxidation pathway, malondialdehyde reacts with thiobarbituric acid and generates an adduct, which can be measured spectrophotometrically. The FDIrp9 transgenic line engineered to accumulate high levels of SA showed drastically reduced MDA levels compared to the wild type. Interestingly, the NahG transgenic line with depleted levels of SA also showed a slight decrease of MDA. In response to heat stress, the wild type MDA levels were reduced, while those of the FDIrp9 and NahG plants were increased, with the NahG plant exhibiting the greatest increase in MDA content. Thus, the effects of SA on oxidative stress response appear to be complex and can be explained by differing mechanisms that might be directly or indirectly involved in maintaining plant homeostasis.

The Double Knockout of the Haptoglobin-Hemoglobin Receptor in Bloodstream-Form *Trypanasoma brucei brucei* Lister 427-Single Marker Clone

Hayes Patrick
Dr. Stephen Hajduk, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Trypanosome Lytic Factor (TLF-1) is a primate-specific subclass of high-density lipoprotein that is critical for immunity against certain species of parasites called African trypanosomes. The primary mechanism of trypanosome susceptibility to TLF-1 begins at

the haptoglobin-hemoglin receptor (HpHbR) in the flagellar pocket of trypanosomes. The flagellar pocket is a specialized region of the trypanosome cell surface. TLF-1 binds to this receptor, initiating a lytic pathway that leads to TLF-1 endocytosis into the lysosome of the cell. We show here that through the double knockout of the HpHbR in *Trypanosoma brucei brucei* (*T.b.brucei*), there is a significant increase in trypanosome resistance to TLF-1. The knockout of the HpHbR was visualized through a combination of qualitative and quantitative analyses. These data are consistent with the claim that the HpHbR is the primary source for TLF-1 binding and uptake. With the elimination of the HpHbR in our *T.b.brucei* cell line, we are now able to explore additional contributors to TLF-1 resistance. Through RNA-interference screening of a candidate construct into these cell lines, we can identify target proteins and begin to see what other factors contribute to trypanosome susceptibility to TLF-1. RNAi of candidates will allow us to knockdown target proteins and test for changes in sensitivity to TLF-1. If measurable changes are found, we can ectopically express tagged versions of those proteins in order to assess their functions, which could be shown through colocalization with TLF-1 or other steps along the TLF-1 lytic pathway.

Association between Body Composition and Serum Folate Concentrations in Women of Childbearing Age: Secondary Analysis across Three Studies

Meagan Patterson
Dr. Dorothy Hausman, Foods & Nutrition, College of Family & Consumer Sciences

Sufficient folate status is important before conception in reducing the risk of neural tube defects (NTDs). As maternal obesity is also a risk factor for NTDs, this study asked the question: "Is there a relationship between serum folate and body composition in women of childbearing age?" A secondary analysis was performed in normal weight and obese women using data from three previous studies in our laboratory (n=94; average age=24.3, range=18-40; average BMI=28.2, range=18.3–56.8), for which serum folate (microbiological assay) and body composition including total mass, fat mass and fat-free soft tissue measures (dual energy X-ray absorptiometry (DXA)) were available. Bivariate and partial correlations were determined using SAS. Across these three studies, fasting serum folate concentrations were lower in the obese as compared with the normal weight women (16.34±1.03 ng/mL versus 21.04±0.87 ng/mL, $p<0.001$) and inversely correlated with both BMI ($r=-0.366$, $p<0.0001$) and total body mass ($r=-0.374$, $p=0.0002$). The association between serum folate and total body mass remained significant after correction for age, diet, oral contraceptive use and parity ($r=-0.396$, $p=0.0003$); was attenuated by further correction for fat mass ($r=-0.247$, $p=0.028$); and eliminated by alternatively correcting for fat-free soft tissue ($r=-0.059$, $p=0.605$). This suggests that the lower serum folate concentrations in obese women of childbearing age may be explained, in part, by an increased amount of metabolically active fat-free soft tissue. These findings provide additional evidence for consideration of body composition in intake recommendations for improving folate status and reducing the risk of birth defects in women of childbearing age.

Issues in the Therapy Experience for the LGBT Community and Their Implications

Kinsey Pebley
Dr. Patricia Richards, Sociology, Franklin College of Arts & Sciences

Little work has been done to acknowledge or address the shortcomings of the therapeutic experience for lesbian, gay, bisexual, or transgender (LGBT) identified individuals. This topic is of particular importance given

that members of the LGBT community are at a higher risk for mental health difficulties, as they face unique stressors concomitant with heterosexism (Bos et al., 2008). While many therapists resolve to remain objective, they may inadvertently disrespect or display limited knowledge about the experiences and preferences of these individuals. Sixteen LGBT persons who had been to therapy participated in interviews in which they were asked to speak to their experiences, specifically if the experience was beneficial for them and what could have made it better. Salient themes that emerged from qualitative analysis of these interviews included use of sensitive language (such as use of gender-neutral pronouns), a desire for community, agency in seeking support outside of a traditional setting, and the challenges of identifying safe spaces. Psychologists are ethically bound to practice cultural competency ("Ethical principles of," 2014) and be sensitive towards the identities of their clients. These findings can help to fill the gaps of knowledge relating to issues prevalent in the LGBT community and provide a greater sense of safety within the therapeutic setting, thereby reducing the risk of mental health problems affecting these communities.

New Aid for Africa

Anne Pellegrino, Jonah Driggers, Elijah Scott, Meili Swanson, Luke Thompson, Patrick Wheat
Dr. Brock Tessman, International Affairs, School of Public & International Affairs

The nations of the Great Lakes region in Africa are struggling under the dual challenges of corruption within state governments and economic underdevelopment, which have both limited the effectiveness of foreign aid and foreign investment within the region. These issues spring from a combination of ineffectiveness and redundancy of current regional organizations, a lack of proper physical and institutional infrastructures, and a lack of current local incentive or regulation to limit corruptive influences within the nations themselves. To best combat these issues, USAID should employ a three-pronged economic approach: the creation of a micro-lending program to allow for allocations to be spent directly by citizens to grow their national economy, a focus on distributing aid towards public-private partnerships to increase domestic growth, and the reinforcement of funds to support pre-existing Regional Economic Communities within the African Union. These three approaches create the opportunity to broadly address these issues of corruption by removing corruptive factors from the distribution process, while creating the opportunity to stabilize the economies of the Great Lakes region. To demonstrate the effectiveness of this three-pronged policy approach, we will evaluate similar attempts in the Great Lakes region, and evaluate the success of such programs when applied to our three-pronged policy solution. Nations included in this evaluation will include the United Republic of Tanzania, the Republic of Kenya, the Republic of Uganda, the Federal Democratic Republic of Ethiopia and the Democratic Republic of the Congo.

Football Facemask Mass Influences Head Impact Location

Tracy Phan
Dr. Julianne Schmidt, Kinesiology, College of Education

Objectives: 1) To determine whether players with heavy facemasks have increased odds of sustaining impacts to the top of the head. 2) To determine whether there is a significant difference in head impact severity between players with heavy versus light facemasks. *Participants:* Twenty-five collegiate football players. *Interventions:* Facemask type and mass were determined. Head impact location and severity were captured for 7,135 head impacts using the Head Impact Telemetry System. *Main Outcome Measures:* 1) We categorized

facemasks as either heavy (>484g) or light (<=484g) using a median split. We computed the odds ratios for sustaining top of the head impacts between facemask groups using a random intercepts proportional odds model. 2) We compared head impact severity (linear and rotational acceleration) between groups using a random intercepts general linear model (α=0.05). Player position was included in all models. *Results:* Players with heavier facemasks had reduced odds of sustaining frontal (OR:0.42, 95%CI:0.22,0.81) and right side (OR:0.47, 95%CI:0.26,0.83) rather than top of the head impacts. Head impact severity did not significantly differ between groups. *Conclusions:* Players with heavier facemasks may have increased odds of sustaining impacts to the top of the head because they adopt a head-down tackling technique. Decreased odds of sustaining right side hits may be due to variable aspects such as player location or play. Other factors such as a player's tackling technique, physical fitness, and neck strength may also play a role in head protection.

Transferrin-Crosslinked Liposomes for Targeted Drug Delivery to *Trypanosoma brucei*

Aparna Philip
Dr. Stephen Hajduk, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Trypanosoma brucei is a protozoan parasite that causes African sleeping sickness in humans and nagana in cattle. Without treatment, both sleeping sickness and nagana are fatal, leading to thousands of human and millions of cattle deaths annually. Available therapeutics are fraught with severe side effects, difficult to deliver and prone to the development of resistance. Our laboratory has developed a small hydrophobic peptide (SDLGAVISLLLWGRQLFA) (SHP) that is uniquely toxic to the mammalian bloodstream developmental stages of *T. brucei*. Bloodstream form of *T. brucei* showed a LD50 (median lethal dose) of ~8 μM for SHP *in vitro*; however, the limited solubility of the peptide led us to investigate the development of drug delivery platforms that would increase the efficacy of SHP. Here we describe recent efforts to deliver SHP to these parasites via liposomes crosslinked to bovine-transferrin, using an N-linked lipid conjugate (cyanur-PEG), for receptor mediated endocytosis. First, we utilized liposomes loaded with the fluorescent dye calcein to monitor the binding of transferrin (an iron transporter) to its receptor in the flagellar pocket, the site of all endo- and exocytosis in *T. brucei*. Fluorescence microscopy was used to visualize the binding of calcein-loaded liposomes to the flagellar pocket of the trypanosomes at 3°C. Our data indicates that transferrin-crosslinked, but not the uncrosslinked, liposomes bind to the flagellar pocket. The efficiency of SHP binding and toxicity is currently under investigation.

Investigating Missense Mutations in O-GlcNAc Transferase that Lead to Human X-Linked Intellectual Disability

Sindhu Prabakaran
Dr. Lance Wells, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

O-GlcNAc modification is a distinct form of protein glycosylation that occurs on serine and threonine residues of cytoplasmic and nuclear proteins. This form of protein glycosylation is an abundant and inducible modification found in all higher eukaryotes, and is facilitated by two enzymes, *O*-GlcNAc transferase (OGT) and *O*-GlcNAcase (OGA). Recently, the Schwartz group identified mutations in OGT in three X-linked intellectual disability patients in a family that also displayed a short stature, small head circumference and fifth finger Clinodactyly. Additionally, two of the three had hypospadia. This linked a missense mutation, L254F, in OGT to a human disease for the first time.

The aim of our work is to elucidate the impact of L254F on the OGT enzyme. Using a combination of work with patient lymphoblasts and *in vitro* recombinant OGT enzyme we have determined that the mutant enzyme appears to be active but unstable. Also, we have uncovered a compensation mechanism, albeit imperfect given the patient phenotypes, by which a reduction in OGT levels leads to a reduction in OGA levels in an effort to maintain global O-GlcNAc levels. We are currently exploring both the stability and kinetic parameters of recombinant OGT, as well as the impact of this mutant on global transcriptional regulation.

A Yeast-based Screen for Drugs That Can Inhibit Human *Cdc6*

Ojaswa Prasad, Dennis Dwan
Dr. Edward Kipreos, Cellular Biology, Franklin College of Arts & Sciences

Cdc6 is a highly conserved protein that is required for the initiation of DNA replication in humans and most eukaryotes. We are using the fission yeast *Schizosaccharomyces pombe* for our studies. In fission yeast, the *cdc18+* gene encodes the *Cdc6* ortholog. Fission yeast cells are rod shaped and divide by medial fission. Their division cycle is quite rapid which, in addition to being inexpensive and easily manipulated, makes them easier to use in the laboratory. Cells lacking the *cdc18+* gene fail to enter S phase and undergo DNA replication, although the cells still undergo nuclear division according to Nurse and Kelly. Nurse and Kelly also found that overexpression of *cdc18+* results in cells arresting in S phase and increasing their DNA content to levels much greater than 2C through the aberrant process of re-replication. We want to screen for compounds that inhibit the overexpressed *Cdc18* protein, which will reduce the level of *Cdc18* activity so that cells do not arrest in S phase and undergo re-replication, and instead are able to proliferate. After optimizing growing conditions for the yeast, we successfully transformed three different plasmids containing the *cdc18+* gene into the fission yeast. We also successfully induced the overexpression of the *cdc18+* gene and saw the expected re-replication phenotype. Our goal is to clone the human *Cdc6* gene into a fission yeast expression construct. We want to introduce the human *Cdc6* gene into fission yeast and induce overexpression of the gene. If the overexpression of human *Cdc6* induces re-replication of the genome and an S-phase arrest then we can use this yeast in a screen for compounds that inactivate the human *Cdc6*, and thereby allow the yeast to proliferate normally. The yeast cells with overexpressed human *Cdc6* will be tested with numerous compounds from a small molecule library in Dr. Kipreos' lab to decrease or eliminate DNA re-replication and rescue the human *Cdc6* overexpression phenotype. This screen can identify lead compounds that specifically target human *Cdc6* and inhibit its function in DNA replication.

Suboptimal Time in Therapeutic Range (TTR) for International Normalized Ratio (INR) Measurements Observed in an Outpatient Cardiology Clinic: Impact of Gender, Ethnicity, Disease Etiology, CHADSVasc score, Physicians and Clinic Site

Sarah Premji
Dr. Karl Espelie, Biological Sciences, Franklin College of Arts & Sciences

TTR correlates inversely with ischemic stroke risk. Variations in TTR are common with a range of between 55-60% being normal and > 70% being optimal. It was previously unknown which factors impact TTR most in the community cardiology setting. Retrospective chart review was conducted of all patients (pts) being treated with warfarin in a single, multi-site suburban, outpatient cardiology practice for one year. Hypertension and hyperlipidemia were common, while diabetes, smoking, alcohol and aspirin use

were less. Atrial fibrillation was the most common reason for treatment followed by mechanical valves, venous system disease, and arterial system disease. An average of 12+5 INR readings/pt were done over the year. Average time on warfarin was 35+18 months. TTR for the overall group was 44.5 + 22.3%. TTR varied significantly among ethnicity, the seven individual physicians managing INR and the four clinic sites. Clinics and physicians having a higher proportion of African American pts tended to have lower TTR. TTR was worse in pts with arterial and venous disease vs. atrial fibrillation and mechanical valves. Our findings suggest that TTR may be substantially worse in clinical practice than previously published literature would suggest. Patient ethnicity, ordering physicians, clinic site, and disease etiology all affect TTR. Duration on therapy is the most significant factor and ethnicity is second contributing to TTR. Novel anticoagulants should be discussed more often with patients at higher risk of poor TTR. Confirmation of these findings in a broader population could have significant implications for future anticoagulation management and stroke prevention.

Validating *In Vitro* Cell Culture Models for Molecular Pathogenesis Studies in *Fktn*-deficient Muscular Dystrophy

Vedika Rajasekaran
Dr. Aaron Beedle, Pharmaceutical & Biomedical Sciences, College of Pharmacy

Muscular dystrophies may be associated with a change in activity in the PI3K/Akt/mTOR signaling pathway that is important for cell survival and growth. Therefore, our objectives are to establish an experimental protocol to study this pathway using *in vitro* cultures of normal mouse skeletal muscle C2C12 cells, establish primary muscle cultures from inducible *Fktn* knockout mice, and evaluate changes in the pathway due to muscular dystrophy defects. We differentiated C2C12 cells into myotubes, then successfully inhibited and/or stimulated the PI3K pathway in serum starved cells as demonstrated by histological and biochemical analysis. In addition, we developed conditions for isolation and cultured skeletal muscle cells from *Fktn* muscular dystrophy mice and normal mice. Analysis of the PI3K/Akt/mTOR pathway in this model is ongoing. Overall, our *in vitro* studies offer the ability to complement our *in vivo* work in the role of the PI3K/Akt/mTOR signaling pathway in the pathogenesis of *Fktn*-deficient muscular dystrophy.

Purification of Xyloglucan-Specific Endo-β-1, 4 -Glucanase after Expression in *Escherichia coli*

Ramon Reddick
Dr. William York, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

A protein consisting of xyloglucan-specific endo-β-1, 4-glucanase (XEG) and enhanced Green Fluorescent Protein (eGFP) was prepared by heterologous expression of a genetically engineered plasmid in *Escherichia coli*. Initial experiments indicated that an eGFP-pET28a vector is efficiently expressed in *E. coli* to generate eGFPi. Another pET28a vector containing DNA encoding XEG fused to eGFP was then generated and transfected into *E. coli*, which expressed the desired chimeric protein. Conditions for optimizing the production of soluble forms of the fusion proteins were identified and the soluble proteins were purified. Mutagenesis of the XEG component of the protein inactivates the catalytic mechanism of XEG on xyloglucan, but still enables the protein to attach to the polysaccharide. Attachment to the polysaccharide without catalysis allows for the fusion protein to be administered in living plant tissue for further observation. These proteins are potentially powerful new tools for studying the chemical structure and physical properties of plant cell walls. For

example, they can be used to visualize and quantify xyloglucan in different cells as the plant develops. Such information may have important implications for technologies aimed at the economical production of biofuels from non-food sources.

Neonatal Mortality in Uttar Pradesh, India and Possible Policy Solutions

Hannah Reiss, Foundation Fellow
Dr. Richard Schuster, Health Policy & Management, College of Public Health

Neonatal death is defined as death within the first four weeks of an infant's life. According to a 2009 study published in the International Journal of Obstetrics and Gynaecology, nearly four million neonates die annually, and over one million of these die in India. The high neonatal mortality rate (NMR) in Uttar Pradesh, India drives up the national NMR. Because neonatal death comprises over 40% of death before the age of five, it also hinders the achievement of the fourth United Nations Millennium Development Goal, which is to reduce global child mortality by two-thirds by 2015. In addition to mortality, high NMR causes morbidity in the survivors. Low neonatal survival rates are associated with negative economic impacts and unsustainable population growth. Possible policy solutions to address high NMR in Uttar Pradesh include a home checklist for midwives, increased payment to Accredited Social Health Activists (ASHAs) to incentivize postnatal visits, and a tetanus immunization campaign. These three alternatives were evaluated through a multi-goal analysis to evaluate their impact, cost, and feasibility. Of the three alternatives, a home checklist for midwives best meets these criteria. This alternative would modify the World Health Organization's Safe Childbirth Checklist, which is currently undergoing efficacy trials in 120 hospitals in Uttar Pradesh.

Creating a Chimeric Chicken Resistant to Newcastle's Disease Virus

Hannah Reiss, Foundation Fellow
Dr. Steven Stice, Animal & Dairy Science, College of Agricultural & Environmental Sciences

Newcastle's Disease Virus (NDV) is a contagious disease that affects avian species. NDV causes respiratory symptoms in many birds, but it is especially virulent in chickens and often results in death. The Center for Food Security & Public Health reported in 2011 that NDV is the most economically detrimental virus in poultry worldwide. Because of its severe effect on chickens, NDV is also the largest pathological constraint in raising village chickens throughout Africa, according to a study conducted by J.G. Bell in 1991. Vaccine delivery to immunize village chickens is generally financially impractical because of the long distances between villages. Because vaccination is not feasible, genetic modification to improve the chicken immune system is now underway. The RIG-I gene begins a cascade immune response by signaling the mitochondrial antiviral signaling (MAVS) pathway and is thought necessary in staging an antiviral response to NDV. Chickens lack RIG-I, which is believed to account for their weak immune response to NDV. We hypothesized that transfecting human RIG-I into the chicken genome would allow the chicken a stronger immune response against the virus. We injected primordial germ cells (PGCs) that had been transfected with RIG-I into chicken embryos. We then dissected the embryos to see whether the PGCs had migrated to the gonads of the embryo seven days post-injection. Following dissection, we saw minimal integration of RIG-I into the gonads of the injected embryos.

Abstracts

College Credit Experience and Financial Literacy

Anthony Reyna, CURO Honors Scholar
Dr. Brenda Cude, Housing & Consumer Economics, College of Family & Consumer Sciences

The purpose of this research is to identify a correlation between college students' credit experience and their financial literacy. For this project, financial literacy was measured by financial knowledge based on percentage scores on a 30 question financial knowledge test. The test was administered at the beginning of the semester to University of Georgia students enrolled in the "Money Skills for Life" course (HACE 3110) from 2008-2012. Credit experience was measured in four ways – whether the student used credit (binary variable measured as 1 if the student's credit report consisted of any accounts attached to their name, zero otherwise), the ownership of the credit (a binary variable measured as 1 if the student had individual ownership of at least one credit account, zero otherwise), the debt-utilization ratio (the ratio of a student's total current balances to his/her total available credit), and a student's total number of open credit accounts. The credit experience data come from credit reports submitted as student assignments in HACE 3110 from 2008-2012. We used Microsoft Excel to build the dataset and the statistical analysis program SPSS to calculate the four correlation coefficients. By identifying the connection between financial literacy and certain aspects college students' credit experience, UGA will be better equipped to financially educate its students and assist them in improving their financial behaviors.

Searching for Noise-Induced Phase Transitions in Ecological Systems

Giovanni Righi, Foundation Fellow
Dr. John Drake, Odum School of Ecology

This project develops a model to represent photoinhibition of a phytoplankton population in a light-limited chemostat. Photoinhibition is the decrease in photosynthesis with an increase in light, which occurs at levels of light incidence that are "too high" for the species. This gives rise to an allee effect by which, in a mixed system, phytoplankton in the upper layer will shade the lower layer to prevent photoinhibition. As irradiance continues to increase, it will arrive at a threshold where the irradiance causes the self-shading to be insufficient and the population collapses. After that point, because the phytoplankton can no longer self-shade, it cannot survive in the higher levels of light incidence that it could prior to the collapse. The identification begins with a series of simulations in R. As in Veraart et al. (2012), we want to show that this model exhibits the properties of catastrophic collapse, but in this case due to a noise-induced phase transition. In this type of regime shift, a population is caused to collapse by a change [increase] in the variance of some stochastic environmental parameter rather than its mean or mode values. These have been shown to occur in other natural systems but not in ecological systems. Noise-induced phase transitions are a potentially transformative topic because environmental ("exogenous") variation is increasing in many systems and is recognized as the chief source of variation in systems; it could present a different cause of critical transitions that has not previously been studied.

Abstracts

Addressing Droughts and Water Overuse in the Flint River

Giovanni Righi, Foundation Fellow
Dr. Rob McDowell, Environmental Policy, Carl Vinson Institute of Government

Without further action to address low flows in the Flint River Basin (FRB), streams used primarily for agriculture and by many municipalities for wastewater discharge could increasingly run dry, particularly in drought years. These water limitations could threaten the Georgia agricultural heartland and its billion dollar revenues, further reduce habitat for the four endangered mussels, thirteen endangered plants, and other endangered species in the basin, and aggravate downstream users. Certain sections of the Flint River tributaries were already observed to be dry in 2012, but the Environmental Protection Division (EPD) had few regulatory tools available to sufficiently address the drought. The only strategy used to increase water flow in the FRB were the irrigation reduction auctions of 2001-2002, which have not been implemented since then because the state has not been willing or able to finance them. This demands that a new water management plan be developed for the FRB. This project explores the possibility for an expansion of irrigation efficiency projects, pricing water to fund an insurance program that can be used to compensate farmer losses during drought, and allowing for the trading of permits under certain conditions as tools for the state to reduce water demand. It makes a case for the necessity of water pricing using limited cost-benefit analysis.

1970s Czechoslovakia: A Foundation for the Study of International Human Rights Law

Marco Roca, CURO Honors Scholar
Dr. Daniel Hill, International Affairs, School of Public & International Affairs

1970s Czechoslovakia, the heart of the Eastern bloc during the Cold War, was one of the most interesting times and places in history. Soviet politics, the forced consolidation of the Czech Republic and Slovakia, and several other factors all sowed the seeds of rebellion during this period in Czechoslovakia's history. However, what sets 1970s Czechoslovakia apart from other dissident movements throughout the Eastern bloc is the dissident groups' distinct intensity, abnormally good documentation, and their success with the peaceful Velvet Revolution regime change. For all of the given background reasons, Dr. Hill and I decided to test our hypothesis that dissident groups use international law as a rallying point to raise support among a repressed population. My methodology was combing through various court cases, constitutions, primary sources, and historical analysis in an effort to synthesize evidence in favor of (or in opposition to) our hypothesis. Our findings indicate that dissident groups such as Charter 77 and VONS often cited international laws such as the ICCCPR and the Helsinki Accords. The implications are enormous, because we now have a well-documented case study in which international laws affected the domestic policies and human rights of people around the world. Using the research on 1970s Czechoslovakia as a foundation, I will use the second part of the presentation to demonstrate the additional research we have conducted with international law and its effects on human rights. Emphasis will be placed on recent research with human rights law and its effect on economic inequality worldwide.

Abstracts

An Integrated Approach for Verification of Rapid Focused Recharge Zones in the Arabian Peninsula Using Thermal and VNIR Remote Sensing

Rachel Rotz, CURO Graduation Distinction
Dr. Adam Milewski, Geology, Franklin College of Arts & Sciences

In the Arabian Peninsula, freshwater recharge is typically focused in small depressions that fill with seasonal runoff to form freshwater lenses. This study will substantiate previously hypothesized lens locations and detect water in the subsurface by using remote sensing techniques. We hypothesize, due to the unique heat capacity of water, recharge zones can be detected by identifying areas with lower diurnal changes in surface radiance values than neighboring dry areas after peak or sustained rainfall. We collected images in the visible near-infrared and thermal infrared wavelengths over the Arabian Peninsula. Overlapping diurnal images were subtracted to show surface radiance fluctuations and then compared with existing rainfall data. Results demonstrate the potential for groundwater detection through the presence of ephemeral water bodies in hyper-arid regions en masse. Several recharge zones, runoff channels, agricultural regions, and wetlands were detected in areas where radiance values change between 0.067 - 2.25 $w/m^2/sr/\mu m$ from day to night scenes. Additionally, two seasonal peak rainfall (~35mm/day) events correlate well with the surface radiance difference values. Surface radiance values for dry areas adjacent to the postulated lens locations range between 2.25 – 12.2 $w/m^2/sr/\mu m$. Radiance values in areas where small relative change occurred were compared to corresponding surface reflectance values and ranked. Highly ranked locations were interpreted as best candidates for recharge zones and freshwater lens locations.

Lester Moody: A Man, a River, and a Quest for Industry in the Twentieth Century South

Anthony Sadler, CURO Summer Fellow
Dr. Brian Drake, History, Franklin College of Arts & Sciences

Lester Moody brought great change to Augusta, the Savannah River, and the South during his tenure as the Secretary of the Augusta Chamber of Commerce. His campaigns for the development of the South's natural resources are barely mentioned in current historiography. Historians tend to group boosters into homogenized categories of environmental, racial, and agricultural villains or progressive, idealistic, and rational heroes of the "New South." The story of Lester Moody, the city of Augusta, and the Savannah River is more complicated. Moody is neither a hero nor villain, he is unique and typical of his status, time, place, and race—all of which were distinctly Southern. The environmental factor of Southern twentieth-century history is viewed as a side-note. The people of Augusta were devastated by a history of floods long before the boll weevil passed through cotton fields. Their environment, altered by centuries of intense farming was unforgiving and needed to be controlled, regulated. Within this psychological framework, Augusta's business leaders gave power to unelected leaders like Lester Moody to solve economic and environmental problems. He took that power, and with the help of more powerful allies such as Richard B. Russell, Jr., Walter F. George, and Strom Thurmond among others, secured three federally-funded dams, the Savannah River Plant, and the expansion of Camp Gordon into a Fort. He did much but was greatly empowered by the citizens of Augusta to do so, which explains the endurance of a positive legacy, one mired by contradictions, broken promises, and environmental disaster.

Abstracts

A Unique Mechanism in *Staphylococcus aureus* Ketopantoate Reductase

Joseph Sanchez
Dr. Zachary Wood, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Methicillin-resistant *Staphylococcus aureus* (MRSA) is a difficult-to-treat pathogen that is responsible for more than 11,000 deaths each year in the United States. There is an urgent need to develop new targets for discovery of drugs to treat *S. aureus* infections. Here we have examined the mechanism of *S. aureus* ketopantoate reductase (KPR), which produces the essential metabolite pantoate. It has been reported that KPR exists as a monomer and follows a sequential ordered mechanism of substrate binding in which NADPH binds before ketopantoate (KP). Here we show that the mechanism of *S. aureus* KPR is distinct from previously studied homologs. Combining analytical ultracentrifugation (AUC) with two new crystal structures, we show that KPR forms a dimer in solution. Furthermore, steady-state kinetics reveals that KPR displays kinetic cooperativity. This is a rare phenomenon in which KPR follows a kinetically preferred but not absolute order of binding substrate and cofactor. We confirm this result using equilibrium binding assays based on intrinsic protein fluorescence and fluorescent resonance energy transfer (FRET). Finally, we have solved a new 1.8 Å resolution crystal structure, which shows that KP binding to the large active site partially occludes NADPH from the cleft. This is consistent with our kinetic data showing that saturating concentrations of KP can inhibit the enzyme. The unique mechanism of *S. aureus* KPR suggests that it may be possible to specifically target this enzyme in rational drug design efforts.

Lesbian Dress: Recognizing and Being Recognized

Nancy Satola
Dr. Katalin Medvedev, Textiles, Merchandising & Interiors, College of Family & Consumer Sciences

The lesbian community's use of dress should be of interest to the fashion industry because lesbian women interact with the industry differently than heterosexual women. Because lesbian women, just like every other social group, rely on fashion as a means of communication, a personal and political agenda exists in their use of fashion. My research focuses on three groups within the lesbian community. I start with the politics and influence of 2nd wave feminism on the butch lesbian community. Butch lesbians use dress as an in-your-face expression of their sexual orientation and to express the rejection of heteronormative values of mainstream society. The politics and dress practices of butch lesbians have created a demand for gender-neutral fashion and opened up the industry to androgyny, even in high fashion. Unlike butch lesbians, lipstick lesbians do not adhere to the values of 2nd wave feminism and wish to be perceived as fashionable and trendy. The lipstick lesbian aesthetic rejects the notion that women must discard traditional femininity to be recognized and accepted in the lesbian community. Finally, I examine how lesbian parenting couples assess their physical appearance when it influences the daily life of their children. I argue that these couples are conscious of their dress and manipulate their presentation in different situations for the sake of their children rather than their allegiance to the lesbian community.

Abstracts

Issues of Economic Efficiency in the Domestic Conservation Easement System

Mariana Satterly, Ramsey Scholar
Dr. Tianwei Zhang, Economics, Terry College of Business

Until the passage of federal legislation in the early 1980s incentivizing conservation easements, perpetual property contracts that prohibit building and other environmentally harmful actions on designated parcels, contracted private conservation efforts were rare. Today, however, the Land Trust Alliance estimates that well over 100,000 easements protect nearly 47 million acres of domestic land. While the current high rate of easement establishment is laudable for the sake of environmental stewardship, the incentive system tied to the easement process might be doing more harm than good. This literature review and quest for viable databases on conservation easement records illustrates that an inadequate amount of time and effort is currently devoted to monitoring easement establishment and the distribution of tax credits following the subsequent reappraisal of burdened lands. While legal papers and IRS statements have stressed more robust attention to the economic efficiency and possible exploitation of easements in the past decade, the non-uniformity of contracts and the difficulty of tracking community effects after easement establishment have limited research into the economic efficiency of the system, and studies specific to the tax effects of easement establishment are largely absent from the present literature. With the belief that *social* environmental benefits are the foremost concerns of easement establishment, this research attempts to outline the economic issues that should begin any discussion of easement efficiency, prompted by both nonexistent and present studies, before proposing several reform measures that could alleviate exploitation of the system and net social costs.

A Mechanistic Explanation of How Regional Winter Climate Differences Influence Lyme Disease Distribution

Scott Saunders
Dr. Andrew Park, Odum School of Ecology

Lyme borreliosis is the most prevalent vector borne disease in North America and affects more than 20,000 people every year. Why are there few cases of Lyme disease in the Southeast when compared with the Midwest, and Northeast United States? All three regions have populations of the required tick vector, vertebrate hosts and the *Borrelia burgdorferi* pathogen. One explanation for the dramatic difference in prevalence is that *B. burgdorferi* is not maintained at high levels in *Ixodes scapularis* (black legged tick) populations due to an interrupted transmission cycle. A model has been created to test the theory that winter duration and temperature structure the life cycle of ticks, so Northern ticks follow a strict two-year life cycle and Southern ticks are more variable. The consistency and timing of the tick development pattern can favor horizontal transmission of the bacteria through vertebrate hosts when infected nymphs and uninfected larva are abundant at similar times of year. Using only temperature data, and basic information on tick phenology the model stochastically simulates a population developing through the four life stages (egg, larva, nymph, adult), and records how the population grows. Varying the duration of winter in the model shows the population developing differently, and notes if significant transmission is likely to occur between nymphal and larval ticks. This model seeks to explain the distribution of Lyme disease and other tick borne diseases around the world, and contribute to our understanding of how Lyme disease could change in the future.

Abstracts

Investigations of a Protease (Ste24p) Associated with Progeroid Disease

William Saunders, CURO Summer Fellow, CURO Graduation Distinction
Dr. Walter Schmidt, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Ste24p is a metalloprotease that is involved in the processing of prelamin A in humans. The most relevant human disease associated with Ste24p mutation is Hutchinson-Gilford Progeria Syndrome (HGPS). Ste24 is very well conserved across species. Much of what is known about Ste24p comes from its role in production of the **a-**factor mating pheromone in yeast and the work associated with this research takes advantage of **a**-factor as a reporter. The Schmidt lab is actively collaborating with a research group at UVA that was the first to determine the X-ray crystal structure of Ste24. The structure of Ste24p is interesting because it is a membrane bound protein that resembles an oil drum embedded in the membrane bilayer with no apparent point of entry to a central cavity that contains the proteolytic active site. This study used the crystal structure and selective mutation to change specific residues in the protein and genetic methods to test the mutant protein's activity level in order to establish a possible mechanism for the protein. We have confirmed the importance of residues proposed to be part of the active site, including residues that have functional overlap with those found in bacterial thermolysin. We have investigated several hinge points in the structure as possible mobile domains that would allow access to the active site. Results from this study reveal that residues are critical to the proper functioning of the protein and the implications of these findings will be discussed.

Vocal Repertoire of Red and Green Macaws

Natalie Schwob, CURO Summer Fellow
Dr. Dorothy Fragaszy, Psychology, Franklin College of Arts & Sciences
Dr. Roberta Salmi, Anthropology, Franklin College of Arts & Sciences

Red and Green Macaws (*Ara chloropterus*) are highly encephalized, socially complex birds that form long-term pair bonds, often flying wingtip to wingtip with their mate. Despite abiding interest in Psattacids, limited research has been done on wild macaws, and basic features of their biology and behavior remain unknown. Here, we provide the first quantitative description of the vocal repertoire of the Red and Green Macaws living in the *Cerrado* (Brazilian savannah) landscape in northeastern Brazil. We digitally recorded 327 calls collected over 9 weeks of fieldwork. From those calls we selected 78 calls/notes based on acoustic quality for further analysis. We used discriminate functional analysis to determine how calls can be categorized by only their acoustic structure. The vocal repertoire of these macaws includes 10 different calls and 5 different notes, with 87.8% of original grouped cases correctly classified (83.8% cross-validation). Calls were used independently and notes are combined into longer sequences. Additionally, we describe the presence of non-linear phenomena in some of those calls including sunharmonics, biphonation, and non-random chaos. This study will provide the first description of the Red and Green Macaw's acoustic repertoire, which will assist in future macaw communication research.

Abstracts

Incidence of Anesthesia-Related Fatality in Birds

Amanda Seamon
Dr. Erik Hofmeister, Small Animal Medicine & Surgery, College of Veterinary Medicine

Anesthesia related fatality rates in dogs and cats are .17% and .24% respectively. Anesthesia related fatality rates in people are even lower at .02-.005%. The anesthesia related fatality rate in birds is unknown. The purpose of this project is to determine what the fatality rate is in birds due to general anesthesia. Our hypothesis is that birds will have a higher fatality rate due to anesthetics than the rates of dogs, cats, and humans. Cases were identified by searching the electronic medical records database at the University of Georgia's Veterinary Teaching Hospital for 'avian' and any anesthesia-related charge. Data collected from the record includes species, age, gender, wildlife status, weight, BCS, diagnosis, procedure, ASA status, premedication, analgesic technique, induction and maintenance medication, fluid type and route, anesthesia duration, surgery duration, recovery duration, crystalloid volume, colloid volume, HR nadir and peak, EtCO2 nadir and peak, inhalant nadir and peak, temperature nadir and peak, cost, estimated blood loss, and intraoperative events. Of the 120 files already completed, 15 fatalities have occurred, with 2 fatalities associated with anesthesia. This data will be later analyzed for correlations in different variables.

Parasite Selective-Pressure Alters Reproductive Strategy in *Littorina saxatilis*, an Intertidal Snail

Chelsea Sexton
Carolyn Keogh, Doctoral Candidate, Odum School of Ecology
Martha Sanderson, Long Island University, Brookville, NY
Dr. James Byers, Odum School of Ecology

Many organisms are known to alter life history strategies in the presence of parasites with strong fitness effects. *Littorina saxatilis*, the rough periwinkle snail, has a complex co-evolutionary relationship with the castrating trematode parasites that infect it. In European sites, Granovitch et al. (2009) found populations of *L. saxatilis* under high trematode pressure were more likely to have higher fecundity at smaller sizes which allowed them to successfully reproduce before infection castrates the snail. Our study focuses on whether there is also an effect of trematodes on brood quality in addition to timing. We will count and measure the embryos in brood pouches of snails collected along the New England shore. The size of ready-to-crawl embryos is a proxy for brood quality and correlated against trematode prevalence in the snails' susceptibility to infection, which has been quantified in previous studies. We expect to see similar results to Granovitch, with higher brood amounts in snails from high prevalence sites, but we also expect to see lower brood quality in these sites as well because these progeny are rushed before the host is properly prepared to allocate to reproduction. This study is part of a larger project aimed at understanding the impact of spatially heterogeneous parasite infection risk on host defense, as well as potential life history trade-offs that result from the host's response to the threat of infection.

Abstracts

Decreasing HIV Incidence in Russia through Needle & Syringe Programs

Rahul Shah
Dr. Meghan Skira, Economics, Terry College of Business

While the global HIV incidence rate has significantly declined within the last decade, it has been rising at an alarming pace in Eastern Europe and Central Asia since the late 2000s, with some estimates putting the increase at over 25%. Injection drug equipment is one of the most common ways through which HIV is transmitted, and in Russia in particular, injection drug users (IDUs) are disproportionately driving the country's HIV epidemic with approximately 37% of Russian IDUs currently infected with HIV. The rate of HIV incidence in Russia will likely continue to rise, as current HIV-prevention measures are not centered on the IDU population. Providing access to sterile needles and syringes is a highly effective method of reducing HIV infections among injection drug users. Needle & syringe programs (NSPs) provide injection drug users with access to sterile drug equipment in order to reduce the transmission of HIV by decreasing the sharing of contaminated needles among IDUs. Since a high HIV prevalence in IDUs can spread rapidly through sexual transmission to the general population, preventing the spread of HIV among IDUs will help to address the growing epidemic in Russia. NSPs are not only cost-effective, they are also cost-saving, with implementation costs of NSPs being offset with savings in healthcare. In order for Russia to significantly reduce the rate of new HIV infections, there needs to be strong governmental support in addressing the HIV epidemic among IDUs by supporting and funding a large-scale implementation of needle and syringe programs.

Reducing Vitamin D Deficiency among Individuals Aged 50 and Older in Georgia

Sheela Sheth
Dr. Richard Lewis, Foods & Nutrition, College of Family & Consumer Sciences

In Georgia, men and women aged 50 and older are often unaware that they are vitamin D deficient until they are diagnosed with osteoporosis or have a fracture. Georgia's population of individuals above the age of 50 is rising rapidly over the next few years, and the economic and social toll fractures have on society will rise proportionately. It is projected that there will be about 49,500 osteoporotic fractures and $570 million spent on caring for those with osteoporotic fractures in Georgia hospitals by year 2025. In Georgia, current policies do not address the need to educate patients on vitamin D intake, and current programs addressing osteoporosis prevention are underfunded. A literature review was conducted to investigate symptoms and causes of vitamin D deficiency, and stakeholders and successful policies addressing the issue or analogous issues in different contexts were examined. After analysis of the efficacy, cost-effectiveness, and feasibility of three different policy alternatives and the status quo, it was determined that issuing vitamin D guidelines through the Medical Association of Georgia for Georgia's providers to follow and incorporate into practice is the best alternative. By having providers address vitamin D deficiency in patients before fractures, patients will have one less risk factor for osteoporosis, and the medical costs associated with fractures should decrease.

Characterization of Proteoglycans in Prostate Cancer Cell Growth

Sheela Sheth
Dr. Brian Cummings, Pharmaceutical & Biomedical Sciences, College of Pharmacy

Glypicans (GPC) and syndecans (SDC) are heparan sulphate proteoglycans involved in cell-cell and cell-matrix signaling at the plasma membrane of animal cells; however, increased expression of these proteoglycans is associated with carcinogenesis. Recent studies reveal that glypican-1 and syndecan-1 are enhanced in tumour stroma while reduced in epithelial cells in prostate cancer tissue compared to normal prostate tissue. There are six identified glypican isoforms (GPC-1 to 6) in animal cells; however, little is understood of their expression in non-cancerous and cancerous prostate cells. The goal of this research is to determine the role of glypicans and syndecans in cellular proliferation and metastasis in prostate cancer. Reverse transcriptase PCR (RT-PCR) showed that GPC-1, GPC-4, and SDC-1 were expressed differently in non-cancerous (PCS-440-010) and cancerous prostate cell lines (LNCaP, DU-145 and PC-3 cells), but RT-PCR did not detect GPC-2, 3, 5, and 6 mRNA expressions in these cells. Both GPC-1 and SDC-1 mRNA levels are downregulated in benign cancer cells (LNCaP) and increased in metastatic cell lines (DU-145 and PC-3). Interestingly, GPC-4 mRNA level is highly expressed in PC-3 while there is no difference in PCS-440-010, LNCaP and DU-145. These findings indicate that GPC-1, GPC-4, and SDC-1 are differentially expressed during neoplastic transformation in prostate cancer. These proteoglycans may be involved in cellular proliferation and metastasis of prostate cancer. To test this hypothesis, the expression of GPC-1, GPC-4, and SDC-1 will be knocked down by siRNA in PC-3 cells. Cellular proliferation and metastasis will be assessed by MTT and trans-well assays, respectively.

Genetic Assessment of the Role of TNF and its Receptors (RI and RII) in Placental Malaria Pathogenesis

Chris Slade
Dr. Julie Moore, Infectious Diseases, College of Veterinary Medicine

Placental malaria (PM) is characterized by sequestration of malaria-parasite infected red blood cells and accumulation of mononuclear cells, mainly macrophages, in the intervillous space of a woman's placenta. Macrophages are the main producers of TNF, a pro-inflammatory cytokine. Previous experiments involving pregnant C57BL/6J mice infected with *Plasmodium chabaudi* AS- showed that TNF-neutralization could rescue pregnancy loss at mid-gestation. This suggests that TNF is associated with poor pregnancy outcomes during PM. TNF exerts its role through its receptors, TNFR1 and TNFR2, and induces inflammation and/or cell death. To understand more about the role of TNF in the immunopathology of PM, TNF and TNF receptors (R1 and R2) null mutants and wild-type B6 (C57BL/6J) mice were infected with *Plasmodium chabaudi* AS at day 0 of pregnancy. Mice were followed up and sacrificed at gestation day 10. Clinical metrics were measured at gestation day 0 and from day 6 to day 10. At sacrifice, the placenta was collected and fresh frozen in liquid nitrogen for RNA and protein isolation or fixed in neutral buffered formalin for histology. Preliminary data indicate that TNF and TNFR2 null mutants reach high parasitemia more quickly than TNFR1 null mutant and B6 mice. In addition, weight loss was most severe in infected pregnant (IP) TNF null mutant. However, IP TNFR2 null mutant did not have significant weight loss compared to uninfected mice. Almost all IP mice have anemia by day 9 except for TNFR2 null mutant. This study is ongoing and markers for oxidative stress and apoptosis will be assessed by ELISA, Real time PCR, and immunohistochemistry. Comparative analysis

may reveal a mechanistic role for TNF in the pathogenesis of PM.

The Lines are Drawn: Christian Apologies in Late Antiquity

Ryan Slauer
Dr. Erika Hermanowicz, Classics, Franklin College of Arts & Sciences

Early Christian apologies provide a unique lens through which we can glimpse the relationship between early Christianity and the "outside" (non-Christian) world. The reading of these texts is complicated, however, by the existence of multiple motives for the writers. Though often addressed to Roman authorities, the apologies were intended for Christian audiences as well, and interpretation of the portrayal of Christian communities is made problematic by the recognition of this Christian audience. More specifically, it means that we can only glimpse the relationship between Christianity and the outside world as through a lens, darkly. This research explores the development of the relationship between Christianity and the outside world through these texts, understanding the difficulties inherent in this analysis. The writings of Tertullian, Arnobius, Lactantius, and Augustine are considered, with particular attention given to these authors' political and legal philosophy. It will be seen that these apologies were not merely responses to persecution and to social and intellectual stigma, rather they were also the drawing of ideological lines in an attempt to differentiate Christianity from the Roman milieu and to instruct Christian communities regarding proper behavior. With these conclusions, this research aims to add food for thought to the historical analysis of early Christianity and its niche in Roman society.

Nut-Cracking Skill in Wild Capuchin Monkeys

Kristen Smith, Rhianna Baldree
Dr. Dorothy Fragaszy, Psychology, Franklin College of Arts & Sciences
Dr. Michael Haslam, Oxford University

Skill, defined as fluid, effective performance under variable circumstances, is characteristic of humans' use of hand tools. The skilled features of tool use by nonhuman animals are relatively unexplored. We aim to contribute to knowledge regarding skillful tool use by nonhuman primates. Wild bearded capuchin monkeys habitually crack hard palm nuts by placing them on an anvil and striking them with stone hammers. Previous studies at the EthoCebus field site in Brazil have shown that monkeys are skillful in aspects of nut-cracking including nut positioning, hammer stone selection, and appropriate striking force. We asked if monkeys at this site handled the hammer stone skillfully prior to and during striking, and conducted a field experiment to investigate. Four adult monkeys voluntarily cracked nuts while we videotaped. Nuts and four stones, individually presented, were provided for the monkeys to use. Two stones (1100 g and 534 g) were symmetrical, and two were asymmetrical (1042 g and 455 g). From slow motion video (120 fps), we are coding when the monkey flipped or spun the stone, and how it positioned its hands on the stone. For each stone, at least 10 and up to 20 strikes by each subject will be analyzed. Evidence for skillful handling of stones will be found if monkeys increase spins and flips, and use more or different hand positions during striking with asymmetric stones while maintaining equal nut-cracking efficiency with both stone types. Supported by UGA, National Geographic Society, and the PRIMARCH project, European Research Council.

Abstracts

Genetic Analysis of the Role of *SMAX7* in Regulating Shoot Architecture

Ishwarya Soundappan
Dr. David Nelson, Genetics, Franklin College of Arts & Sciences

We can significantly impact crop yield by understanding how strigolactone, an endogenous plant hormone, controls tillering or branching in crops. MORE AXILLARY BRANCHING2 (MAX2) is an important regulator of strigolactone signaling, but its signaling pathway is not understood. The *max2* mutant displays multiple developmental defects. *SUPPRESSOR OF MAX2 (SMAX1)* controls some of these MAX2-dependent phenotypes. *SMAX1* and its seven homologs compose an uncharacterized protein family in *Arabidopsis thaliana*. We hypothesized that *SMAX1* homologs could control other *max2* phenotypes. We found that artificial microRNA suppression of *SMAX6, SMAX7,* and *SMAX8* reduces the increased branching phenotype of *max2*. In agreement with our findings, other researchers have shown that a dominant mutation in the *SMAX7* ortholog in rice produces an increased branching phenotype. This mutation is a five amino acid deletion and contributes to increased protein stability. To test the effect of this mutation in *A. thaliana*, and particularly which amino acids are responsible, we are conducting site-directed mutagenesis on *SMAX7*. We are also interested in determining if an EAR motif, which is highly conserved in the *SMAX1* homologs, is necessary for gene function. To further this structure-function study, we will create and transform various constructs of *SMAX7* with deleted domains into wildtype and *max2* backgrounds. An observation of the resulting branching phenotypes from the various constructs can elucidate the mechanism by which this gene and others in the family operate.

Native American Traditional Dress: Drawing the Line between Celebrating a Culture and Making a Mockery of It

Devon Sprague
Dr. Katalin Medvedev, Textiles, Merchandising & Interiors, College of Family & Consumer Sciences

The fashion industry has a long history of borrowing from a vast array of cultures and religions when creating new collections. My research suggests that using the conventional image of the Native American in the world of pop culture not only promotes harmful stereotypes, but is also a contributing factor in preventing them from overcoming consistently low socioeconomic conditions. By studying several academic journals, blogs, and news articles on the subject, I have discovered the historical importance of Native American dress, its misuse in the global fashion industry, and the devastating side effects of its misappropriations in fashion and culture today. Among Native Americans, traditional dress is closely tied to the wearer's dignity and sense of self. The headdress in particular holds deep spiritual meanings and is reserved for sacred ceremonies. Therefore, it is offensive when major retailers take this apparel item out of context and market it as just another trendy fashion accessory. Attempts by companies like Urban Outfitters and Victoria's Secret to do so in recent years has resulted in public backlash. The American sporting industry has also been guilty of using the American Indian image in a way that is reprehensible. With education rates lower than the national average and poverty rates that are much higher, it is evident that Native Americans are severely underprivileged. The practice of abusing and misappropriating their sacred symbols erases their current problems from the American consciousness, which in turn makes it difficult to bring about change.

Abstracts

Increasing Physical Education in American High Schools

Karishma Sriram, Foundation Fellow
Prof. Bryan McCullick, Kinesiology, College of Education

High schools across the nation are not meeting the appropriate physical education requirements to provide students with quality physical education. Studies have shown that states do not mandate the time requirement – 225 minutes per week for physical education classes at the high school level – suggested by the National Association for Sport and Physical Education (NASPE). As a result, nearly half of high school students do not receive the necessary physical education each week. Inadequate facilities, insufficient time during the school day, budget cuts, and poorly-written legislation are the main culprits behind the lack of acceptable levels of physical education, causing reduced physical activity, diminished quality of life, and increased economic costs to society, among other impacts. Furthermore, an increase in physical activity significantly improves individuals' mental and physical health. Physical education in schools is one of the most effective ways to encourage future physical activity participation, as every child has access to school and spends nearly eight hours a day in his or her school. When taught by a trained specialist, physical education classes in schools can effectively build a set of motor skills and a level of confidence to engage in physical activity. To address the lack of adequate physical education in high schools, literature concerning physical education was reviewed and policy solutions were created. After evaluating the proposed policy alternatives using a multi-goal analysis, the policy that prevents the use of substitutions for physical education requirements was determined to be the most effective way of increasing physical education among the high school students.

Bone Fracture Putty: A Combined Stem Cell and Lentiviral Approach

Karishma Sriram, Foundation Fellow
Dr. Steven Stice, Animal & Dairy Science, College of Agricultural & Environmental Sciences

Large bone defects require months of rehabilitation and often end with limb amputation. Mesenchymal stem cells (MSCs) accelerate bone fracture repair via mechanisms complimentary to bone morphogenic protein 2 (BMP2), which induces bone healing. We hypothesized that lentiviral BMP2-transduced MSCs will generate enough exogenous BMP2 to produce heterotopic ossification (HO) in a mouse model, and the MSC will release trophic factors, enhancing the effects of BMP2. First, *in vitro* studies were performed with human bone marrow-derived MSC and human umbilical cord-derived MSC. Cells were transduced with lentiviral red fluorescent protein (RFP) to determine transduction efficiency at 48, 72, and 96-hour time points. Multiplicity of infection (MOI) corresponding to greatest levels of fluorescence was used with cells transduced with lentiviral BMP2 and expression levels were measured with an ELISA at same time points. At 96 hours bone marrow MSC expressed 51,515 pg/mL BMP2 at 10 MOI and 94,940 pg/mL at 50 MOI, while umbilical MSC expressed more BMP2, with 69,958 pg/ml at 10 MOI and 174,592 pg/mL at 50 MOI. Therefore, umbilical MSCs will be used in future *in vivo* studies. Next, a non-obese diabetic/severely compromised immunodeficient (NOD/SCID) mouse model was utilized to test HO by injecting umbilical MSC transduced with lentiviral BMP2 into a leg muscle. HO was evaluated at 1 and 2 weeks post-injection via x-ray, showing circular soft tissue forming after one week and palpable bone after two. We expect to conclude – after further studies using HO, fracture injuries, and large animal models – that Lentiviral

BMP2 in MSC is effective at rapid bone healing.

The Effect of Telomere Dysfunction on Non-Allelic Recombination in the Subtelomere of *Kluyveromyces lactis*

Brianna Stadsvold
Dr. Michael McEachern, Genetics, Franklin College of Arts & Sciences

The subtelomeric region in eukaryotes has a complex repetitive structure, is rapidly evolving, and is under epigenetic regulation. Though this region lacks essential genes, it is enriched for genes critical for rapid adaptation to novel environments. However, the mechanism through which genetic variation is introduced is poorly understood. The adaptive telomere failure hypothesis proposes that, in times of stress, telomere capping can be relaxed in a way that promotes subtelomeric evolution. While functional telomeres are meant to protect chromosome ends, dysfunctional telomeres can be inappropriately repaired by mechanisms such as homologous recombination (HR). Subsequent genetic modifications could have a beneficial effect on the organism's fitness. In the yeast *Kluyveromyces lactis*, the flocculation (*FLO*) genes are thought to be responsible for cell adhesion and contain imperfect internal repeat sequences. It is believed that repeat number is directly correlated with cellular adhesion phenotype. Using the motif finding program MEME, internal repeats within the *FLO* genes found in the subtelomere of *K. lactis* have been identified. These repeats could provide a region of homology for which homologous recombination can undergo. To determine the rate of recombination, *URA3* will be inserted within a *FLO* gene and the rate of loop-out of *URA3* will be measured in wild-type and telomere dysfunction strains. Evidence that recombination is increased in strains with mild genetic telomere dysfunction would support the idea that environmentally-induced telomere function could modulate homologous recombination of subtelomeric genes and ultimately effect the cell's ability to adapt to stressful environments.

The Influence of Neuroticism, Openness, and Conscientiousness on Executive Functioning in Older Adults

Leslie Stapley
Dr. L. Stephen Miller, Psychology, Franklin College of Arts & Sciences

Executive functioning (EF) refers to one's ability to organize thoughts in a goal-directed manner, to plan ahead, and subsequently carry out goal-directed strategies. Several studies suggest that community-dwelling older adults employ EF abilities in order to perform activities of daily living. Declines in EF due to the aging process, therefore, place older adults at greater risk for errors in daily living activities and may compromise their ability to live independently. Research suggests personality traits may significantly predict EF performance in older adults; however, findings have been inconsistent. The purpose of the present study was to examine the relationship between EF and three of the Big Five personality traits: Neuroticism (N), Openness (O), and Conscientiousness (C), in a sample of 46 community-dwelling older adults. It was hypothesized that a) these three traits would carry combined predictive value on EF performance, and b) N, O, and C would each significantly account for unique variance in EF performance. Simultaneous regression revealed a significant combined predictive value of N, O, and C, over and beyond age and education ($R2 = .313$, $p=.023$). Three independent regressions, with an adjusted p-value of .017, revealed that N significantly predicted EF ($R2= .249$, $p=.014$), but O did not ($R2= .136$, $p=.619$). As hypothesized, but contrary to some findings in the literature, C had the largest predictive power on EF ($R2= .284$, $p=.005$). Results suggest that personality may be indicative of EF decline, also suggesting that C is a more

important predictor of EF than previously recognized.

The Linguistics of Artistic Language: Poetry, Complexity, and Mass-Market Novels

Ashleigh Starnes
Dr. Bill Kretzschmar, English, Franklin College of Arts & Sciences

Using the methodologies of complexity science as proposed by William Kretzschmar in his book *The Linguistics of Speech* (2009) – which addresses the statistical characteristics of emergent order in language – we can define stylistic distinctiveness in artistic texts by comparing the shapes and values of their word distributions to a general corpus of linguistic data (i.e. "normal" speech). This study offers a three-way comparison of "Language Poetry" from Ron Silliman's *In the American Tree* (1986), Peter Benchley's novel *Jaws* (1974), and the Brown Corpus (Kucera & Francis, 1961). Using the AntConc corpus program, this study found several parallels between the word distribution patterns in all three texts, despite the Language Poets' aesthetic claim to the distinctiveness of poetic language: the most frequent items were function words, and the word count and frequency of frequencies distributions formed asymptotic, hyperbolic curves characteristic of all language data of sufficient size (Kretzschmar 2009). On the other hand, this study found that unique words comprise about twice the percentage of total words in Language Poetry as opposed to *Jaws* (10.72% versus 5.73%, respectively), and comprise only 1.4% of the Brown corpus. Thus, while the general shape of the distributions are similar – as we would expect for all forms of speech – this data suggests a hierarchy of distinctiveness from "normal" speech patterns in works of language art. This study offers a generally unexplored method of analyzing artistic data and literary style, connecting language as a science and language as an art – a valuable interest for both fields.

Characterization of the *rsr-rtcBA* operon in *Salmonella typhimurium*

Cameron Story
Dr. Anna Karls, Microbiology, Franklin College of Arts & Sciences

The *rtcBA* operon, a conserved set of genes in many bacteria, encodes proteins whose homologues in metazoans and archaea are known to function in RNA repair, but have no known physiological role in bacteria. *In vitro* characterization of *E. coli* RtcA and RtcB demonstrated RNA 2'3' phosphate cyclase and RNA ligase activities, respectively. In *Salmonella typhimurium*, the *rtcBA* operon encodes an additional gene, *rsr* (Ro-sixty related ribonucleoprotein), and two non-coding RNAs. The goal of this research is to characterize the *S. typhimurium rsr-rtcBA* operon, which is controlled by a sigma54-dependent promoter and the activator, RtcR. To determine the environmental stressor that activates RtcR, allowing expression of the *rsr-rtcBA* operon, the promoter region of *rsr-rtcBA* was introduced upstream of *lacZ* on a plasmid. After exposure to stress conditions, promoter activity was monitored using β-galactosidase assays. Stressors investigated thus far include, cold shock, DNA damage via UV light, and exposure to antibiotics, such as chloramphenicol and cefotaxime, to test disruption of translation and cell wall synthesis, respectively. None of these conditions induced *lacZ* expression from the *rsr-rtcBA* promoter. To address a second project goal – identification of gene products that interact with RtcB – we are setting up a synthetic lethal assay. We created a *rtcB-lacZ* transcriptional fusion on an unstable plasmid that will be used to screen a transposon-mutant library of *S. typhimurium*. Mutants requiring maintenance of the *rtcB-lacZ* plasmid will point to genes whose products may interact with RtcB.

Abstracts

The Monkey Saddle
John Stroud, Foundation Fellow
Dr. David Gay, Mathematics, Franklin College of Arts & Sciences

In mathematics, a critical point of a function is a specific point where the function is level or unchanging. A monkey saddle graph is a three-dimensional surface, often studied in multivariable calculus courses, with an unusual type of critical point. The monkey saddle itself is similar to a normal saddle, but with three depressions instead of two, for the monkey's tail. The interesting feature of this saddle is that its critical point is always an inflection point and never a local minimum or maximum regardless of the intersecting plane. We wish to study the monkey saddle to better understand its unusual fixed point and how it changes and creates more fixed points as the parameters of the function change. My research concerns creating a short movie using Sage, an open-source Python-based mathematics software, to generate three-dimensional pictures of the monkey saddle changing as its parameters change. Other methods include using the Tachyon ray-tracing system that works on top of Sage to generate more realistic images.

Solution to Allworthy: The Magisterial Roles of Henry Fielding and Allworthy in *Tom Jones*
Lisa Ye Suh
Dr. Elizabeth Kraft, English, Franklin College of Arts & Sciences

The character of Allworthy in Henry Fielding's novel, *Tom Jones, a Foundling,* has proven problematic for both readers and critics who question Allworthy's true motives. Despite his social standing as a wealthy landowner and local magistrate, Allworthy shows unparalleled benevolence to his less exceptional, sometimes undeserving, counterparts. His altruism extends to his magisterial position in which Allworthy imposes lighter sentences on the accused, favoring redemption over punishment and thereby blurring the line between legal jurisdiction and moral judgment. The character's questionable exercise of authority is no accident as Fielding himself served as chief magistrate of Westminster and Middlesex for several years. Why then, does the author allow his most admirable character to demonstrate such deliberate disregard for English law? In examining Fielding's own legal career, comparisons may be drawn between the magisterial conduct of the author and his character – but what, exactly, is the significance of these parallels? Through a close reading of *Tom Jones* and *A Clear State of the Case of Elizabeth Canning,* Fielding's own account of his involvement in the famous 1753 criminal case, I attempt to answer these questions. Additionally, a biographical study of Fielding's days as magistrate as well as an examination of the 18th century legal system in England may support findings in the close readings. By exploring the function of the character of Allworthy, readers of *Tom Jones* may dispel what critics have dubbed "the problem of Allworthy," gaining insight into the author's literary motivations and juridical contributions in the process.

Fabrication of Hinged Nano-Motors Utilizing Metal Assisted Chemical Etching, Nano-Sphere Lithography, and Physical Vapor Deposition
Mehreen Sultana
Dr. Yiping Zhao, Physics and Astronomy, Franklin College of Arts & Sciences

Catalytic nano-motors are synthetic structures that carry an on-board catalyst and move autonomously using the chemical fuel from the environment by a catalytic reaction. Manipulation of their movement at such a small scale requires understanding of low Reynolds number hydrodynamics, where the viscous force dominates. In such an environment, the geometry of nanomotors

determines the motion and its efficiency. Therefore, investigating how novel geometries affect the motion by simple methods is desirable for the advancement of nanomotors. Here we focus on the design of hinged nanomotors. These structures contain two nano arms linked by a flexible joint, with one arm composed of Si and the other of TiO2. The Pt catalyst will be coated on the TiO2 arm that shall be free to move/rotate. Since the structure has multiple components, each component is fabricated using different strategies. The Si nano arm is fabricated using a 'top-down' approach by metal assisted directional chemical etching of crystalline Si substrate. This step is achieved by a combination of nanofabrication techniques such as metal-assisted wet chemical etching, nano-sphere lithography, and physical vapor deposition. The quality of metal assisted etching is determined using a scanning electron microscopy. The next phase of the fabrication includes creating 'ball-in-socket' joint, and the second arm using oblique angle deposition and glancing angle deposition. The speeds of catalytic micromotors can be measured and used for many biomedical and industrial applications such as DNA sensing, selective isolation of nucleic acids, oil spill cleanup, degrading organic water pollutants etc.

Ecology and Genetic Characteristics of Haemogregarines in Fresh Water Turtles

Scarlett Sumner, CURO Summer Fellow, CURO Graduation Distinction
Dr. Michael Yabsley, Warnell School of Forestry & Natural Resources

Haemogregarines are common intracellular parasites of freshwater turtles and aquatic leeches (the vector). Higher leech loads should be associated with higher prevalence rates and parasitemias; therefore, this study was conducted to assess differences in haemogregarine infections among various aquatic turtles with variable behaviors that impact leech burdens. During 2011-2012, 132 turtles of 10 species were sampled at numerous locations in Georgia, USA. Giemsa-stained blood smears were analyzed to determine prevalence of haemogregarines and parasitemias based on number of infected cells per 7,000 cells examined. To date, significantly higher prevalences were noted for nonbasking species (81%) compared with basking species (56%). Similarly, nonbasking species (0.26%) had significantly higher parasitemias compared with basking species (0.03%). These results indicate that basking behavior has a significant impact on the haemogregarine prevalence and parasitemia levels in turtles. Among the four most commonly sampled species, there was no difference in prevalence between the two nonbasking species (common snappers (*Chelydra serpentina)* [0.12%] and musk turtles (*Sternotherus odoratus*) [0.39%]) but parasitemias of the two basking species were different with sliders (*Trachemys scripta*) [0.05%] having significantly higher parasitemias compared with painted turtles (*Chrysemys picta*) [0.01%]. Lower parasitemias in basking species could be attributed to a reduction in leech exposure, an increase in the host immune response, biology of different haemogregarine species, or another unknown factor. Sequence analysis of partial 18S rRNA sequences from haemogregarines in turtles from Georgia, Canada, and Costa Rica suggests there are at least two parasite species that have little host- or geographic-specificity.

Improving Access to Screening for Post-Traumatic Stress Disorder in Operation Enduring Freedom and Operation Iraqi Freedom Veterans

Meili Swanson
Dr. Neale Chumbler, Health Policy & Management, College of Public Health

The high prevalence of post-traumatic stress disorder (PTSD) in Operation Enduring Freedom and Operation Iraqi Freedom

(OEF/OIF) veterans makes it difficult for veterans to integrate successfully back into society. PTSD in veterans has been linked to suicide, unemployment, substance abuse, homelessness, as well as domestic violence. There are limited policies currently in place that support the re-integration of OEF/OIF veterans back into society. The few current policies in place fail to identify many of the veterans who need treatment for PTSD. Three different policy alternatives were analyzed, evaluated, and compared to the current policy based on three criteria – effectiveness, cost, and political feasibility. According to the conducted research, telehealth is a mechanism that increases veteran access to PTSD screening and can facilitate their further treatment if needed. Telehealth involves using a Skype-like system to connect patients to their providers, face-to-face online. Telehealth applications are also a cost-efficient and politically feasible alternative to the current policies. By integrating telehealth into all VA medical centers, OEF/OIF veterans can be provided with not only more efficient access to care, but can also increase PTSD screening rates by their providers.

Assessing Mitochondrial Function and Fatigue in the Human Gastrocnemius with Near Infrared Spectroscopy (NIRS)

Stephanie Tan, CURO Graduation Distinction, Hannah Bossie, John Hann
Dr. Kevin McCully, Kinesiology, College of Education

Fatigue is known to be the number one symptom in all diseases. By using the NIRS device and the force transducer, assessment of muscle metabolism can be evaluated to assess the correlation between mitochondrial function and fatigue. Each participant was tested three times over the course of two days. The experiment focused on tetanic contractions and 35 Hz was used. The tests were done in the extended (relaxed) and flexed (stretched) positions with the foot at an angle of 70° and 90°, respectfully, with a 10-minute break in-between. During the test, we measured the amount of fatigue with a force transducer and the oxygen saturation consumption using a NIRS device. After the test, we measured the rate of recovery of oxygen saturation using MatLab. Significant inverse correlation was seen between mitochondrial capacity and the amount of fatigue. Stretched positions resulted in lower oxygen levels and slower rates of recovery of oxygen saturation than relaxed positions. This supports the cause of fatigue as impaired oxygen delivery. NIRS studies of muscle are either ongoing or planned for people with SCI, ALS, COPD, PAD, and heart failure. This study will be the first step towards validating a muscle fatigue test that represents muscle oxidative metabolism.

Oxidative Stress within the Placenta during Malaria Infection

Max Tarica
Dr. Julie Moore, Infectious Diseases, College of Veterinary Medicine

The pathology of placental malaria contributes to intrauterine growth restriction and premature birth, leading to low birth weight. In severe cases, abortion and stillbirth occur. These outcomes result from a lack of blood flow that brings the fetus its nutrients. A major cause of this problem in humans comes from the malaria parasites that specifically present with the VAR2CSA antigen, which allows its binding to glycoproteins within the placental intervillous space obstructing blood flow. Other factors, such as inflammatory responses and syncytiotrophoblast damage, are believed to contribute as well. The focus of this study revolves around the production of reactive oxygen species (ROS), which are known to cause cell damage and death. Since mice share a common immunological response with humans to malaria, a mouse model with four

groups of distinct genotypes was used. Mice were either null mutants for TNF (tumor necrosis factor) Receptor 1, Receptor 2, or both receptors of an intact genotype (B6 mice). The TNF family of receptors has been shown to promote cell death through the participation of ROS. For this study, the magnitude of ROS present was indirectly assessed by evaluating the expression of specific genes that are up-regulated during times of oxidative stress via real-time quantitative PCR. Associating the fetal outcome with the extent to which certain ROS are induced within the groups of mice can offer potential targets of interest for intervention that will improve and maintain cell health and function which could protect against malaria-induced fetal complications.

Examining the Function of O-GlcNAc in Regulating Inter- and Intracellular Signaling Pathways during Drosophila Development

Korry Tauber, CURO Summer Fellow, CURO Graduation Distinction
Dr. Michael Tiemeyer, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

The addition and removal of O-linked N-acetylglucosamine (O-GlcNAc) at serine and threonine residues is an essential regulator of intracellular signaling pathways. Like phosphorylation, O-GlcNAc modification acts to significantly alter the function of the protein to which it is attached. There has been considerable research documenting the functional implications of phosphorylation; such as acting as a regulator of cell growth and differentiation. However, the functions of O-GlcNAc are still being discovered and relatively little attention has been paid to the involvement of O-GlcNAc in cell processes. As with kinases and phosphatases, O-GlcNAc modification is controlled by regulated and compartmentalized enzymes; O-GlcNAc transferase (OGT) and O-GlcNAcase (OGA). Currently, it is impractical to study the function of O-GlcNAc in mammalian species because the loss of O-GlcNAc is lethal. However, the genetic tools provided by Drosophila allow us to examine the effects of increasing and decreasing O-GlcNAc levels in selected tissues. This project aims to better understand the function of O-GlcNAc by altering the expression of OGT within specific cells of *Drosophila melanogaster*. Our results indicate that diminishing the attachment of O-GlcNAc to intracellular proteins in engrailed-expressing cells reduces wingless protein secretion. In wing discs, decreased O-GlcNAc in the engrailed component results in the loss of the entire posterior wing section. Additional study has investigated the changes of O-GlcNAcylation in *Sugar Free Frosting (sff)* mutant flies. This project also aims to discuss how a change in expression of O-GlcNAc transferase can limit the effect of repressors that may promote *sff* expression. Further research will aim to examine downstream effects of O-GlcNAcylation in the insulin signaling pathway that may regulate the *sff* phenotype.

Differences in Children's Physical Fitness by Rural or Urban Location

Natalie Taylor
Dr. Jennifer Gay, Health Promotion & Behavior, College of Public Health

Past research reveals that obesity rates among children living in rural areas tend to be higher than those living in urban areas, with the lack of infrastructure (e.g. sidewalks, bike paths, recreational facilities, parks) being a likely determinant. This study aims to investigate whether school children residing in rural areas of Georgia report lower fitness levels compared to urban areas. If the claim holds true, it may suggest some association between the built environment and active living. Using the U.S. Census Bureau definition, towns and cities of Georgia were defined as an urban area (UA), urban cluster (UC), or rural area.

FitnessGram data was provided by 1,473 schools in Georgia to measure physical fitness levels by assessing aerobic capacity, muscular strength, muscular endurance, flexibility, and body composition. Frequencies were calculated for grade level, gender, and geographic location. One-way ANOVA was used to examine differences in the fitness categories by UA, UC, or rural area. Maps were generated using ArcGIS. The sample consisted of 50.1% boys and 55.8% elementary school students. UAs have a higher proportion of students in the healthy fitness zone compared to UC and RA students in cardiorespiratory endurance, body composition, and muscular strength and endurance part 2. Also, UCs were generally less fit than rural areas. All schools may benefit from more physical activity programs, particularly in UC areas. By collaborating with local government officials and businesses, school systems can create environments that are conducive to good health for all students.

Reexamining a Little-Known Aphrodite Anadyomene Statue from Ancient Stabiae
Chiara Tondi Resta
Dr. Mark Abbe, Lamar Dodd School of Art

An over life-size Roman, marble statue of Aphrodite Anadyomene (Greek: "rising from the sea") in the North Carolina Museum of Art is a little-known, but important sculpture. Reported to be from ancient Stabiae near Pompeii, it appears to have been buried in the eruption of Vesuvius, providing it a *terminus ante quem* of 79 A.D. The Aphrodite Anadyomene type was particularly important in central Italy and the Bay of Naples due to her associations with water and bathing which were valued especially by merchants and sailors. But what additional associations might this statue have had in Stabiae in the late republican and early imperial periods? The Roman general Sulla, who conquered the area in 89 B.C., credited Aphrodite for his victories, and the Julio-Claudian rulers of the first century A.D. claimed descent from the goddess herself. As one of the largest and best quality statues of the Aphrodite Anadyomene type known to date, the North Carolina statue is a critical example in understanding how the goddess of love was employed to convey particular political meanings. Using comparative material and some scientific analyses, this presentation will examine these issues as well as the date and probable ancient coloration of this high quality product of Greek craftsmanship.

Variables Affecting Attitudes toward Police
Tiffany Toteno
Dr. Natasha Ganem, Sociology, Franklin College of Arts & Sciences

Police officers have a very important job; protect and serve the community. Yet police can develop a bad reputation on college campuses. This paper seeks to determine what affects students' perceptions about police. There are two research questions presented in this paper: 1) does someone's past experiences with Athens-Clarke County police officers affect how they view the officers of the department and 2) do criminal justice (CJ) students have a more positive attitude toward police officers than students in other majors. This research is noteworthy because little literature is available that studies how CJ students view police, and only students of the University of Georgia were allowed to participate. A convenience sample method was used and each participant was given a link to an online survey in order to collect data. The two independent variables studied are 1) whether or not someone has had any interactions with an Athens-Clarke County police officer and 2) whether they are a CJ major or not. The dependent variable used a Likert scale consisting of five questions about perceptions of police and a Chi square was used for data analysis. The results of both of these studies were significant and proved that

past experiences with police and a student's major do affect how positively they view police officers. Lastly, an additional study was conducted using the first research question and controlling for CJ majors. The results of this study were not significant.

The Five-Fold Division: Shadow Personalities in Beckett's Three Novels
Julian Traas
Dr. Adam Parkes, English, Franklin College of Arts & Sciences

Samuel Beckett's often minimalist, confusing or downright contradictory descriptions of setting, character and situation problematize any plot sketch. Various scholarly articles have posited that the supporting characters in *The Unnamable* are facets of the titular character. Bearing in mind Beckett's interest in Freudian psychology, this paper investigates that notion to its logical conclusion, claiming that Moran, Molloy, Malone, et al., are all merely figments – shadow personalities – of the Unnamable's tortured mind, generated by the Unnamable itself in order to process a deeply embedded and poisonous psychological trauma. This paper's focused analysis of Beckett's *Three Novels* exposes the blatant similarities between each principal character – not limited to maddeningly similar names, fragile teeth, and relative immobility – and links these traits to the respective role each of these shadow personalities plays in the preservation of the Unnamable's psyche. Through scrutiny of each shadow personality's contribution to the Unnamable whole, it proposes a radical approach to Beckett's trilogy which embraces the narrative's scattered nature as part of the solution to its interpretation, rather than part of the problem.

Against All Reason: Rousseau and the Counter-Enlightenment
Brian Underwood, CURO Summer Fellow, CURO Graduation Distinction
Dr. Jennifer Palmer, History, Franklin College of Arts & Sciences

Scholars often count Swiss philosopher Jean-Jacques Rousseau as a chief proponent of Enlightenment thought, a movement at the heart of western intellectual tradition. It is surprising, however, that they consider Rousseau a member of that movement when he himself explicitly challenged Enlightenment tenets at their most fundamental levels. I demonstrate through this project that Jean-Jacques Rousseau was in fact an early figure in a burgeoning Counter-Enlightenment – a direct ideological confrontation of the reason-based philosophy of the Enlightenment, one that began in the eighteenth century and later heavily influenced the dominant continental philosophies of the nineteenth century. This project identifies those central ideas that make Rousseau's ideology distinct from Enlightenment philosophy as a whole, placing his ideology outside of that intellectual tradition. Examining the philosophy of Rousseau in this context offers insight into direct and immediate reactions to the Enlightenment while it was still in progress. In turn, the writings of Rousseau exhibit that the Enlightenment itself was not a monolithic intellectual entity, but instead was a contentious movement even at its height.

Nitrogen Resorption in *Helianthus* Species
Chinyere Uzoigwe
Dr. Lisa Donovan, Plant Biology, Franklin College of Arts & Sciences

Nutrient resorption describes a plant's ability to re-absorb nutrients from senescing leaves. This ability is beneficial because such recycling increases available nutrient for

growth and reproduction. Nitrogen is typically the nutrient most limiting to plant growth and nitrogen resorption can be measured by the nitrogen content difference between green and senesced leaves. Nitrogen resorption efficiency and proficiency were measured in 2-3 populations each of 16 species of wild *Helianthus* grown in a common garden. The levels of resorped nitrogen across populations and species were compared with respect to growth form and life history, home habitat environmental factors, and relative placement along the leaf economics spectrum. First, it is hypothesized that annuals and erect deciduous perennials would have lower resorption ability than basal rosette perennials, which use rosettes of leaves as storage organs for overwintering. Second, it is hypothesized that species from more fertile habitats would have lower resorption ability than species from less fertile habitats, as resorption is costly and would not be favored where soil nitrogen is abundant. Third, it is hypothesized that higher nitrogen resorption would be favored in species with a more "conservative" leaf economics spectrum, as these species are typically found in infertile environments, often use leaves as storage organs, and have a longer leaf lifespan that allows more time for nutrients to be re-absorbed prior to leaf senescence.

A Proteomic Study of the *Botrytis cinerea*-Tomato Interaction

Jerin Varghese
Dr. Carl Bergmann, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Botrytis cinerea is a model necrotrophic fungus that infects more than 200 plant species, one of which is the tomato. Significant protein-protein interactions occur as *B. cinerea* attempts to colonize its host plant. In this study, shotgun proteomics is used to identify the proteins solubilized in the *B. cinerea*-tomato (*Solanum lycopersicum*) interaction. Previous studies have indicated that ripening induces changes in the composition of the fruit cell wall, ultimately resulting in increased pathogen susceptibility. This hypothesis was tested through the use of tomato strains in various stages of ripening, as well as with strains in which ripening was inhibited. AcMG, CnrMG, and CnrRR mutant tomato fruit were infected with *B. cinerea* B05.10, and fungal and fruit proteins were identified post-infection. A total of 30 *B. cinerea* and 152 tomato proteins were identified. Following identification, two master lists (one each for *B. cinerea* proteins and tomato proteins) were compiled. The lists provided information on the function, gene ontology, pfam, CAZy, signal P, secrotome P, and TMHMM for each of the proteins. The identified proteins were then regrouped and analyzed based on which mutant fruit (AcMG, CnrMG, and CnrRR) the respective proteins were found in. Fungal and tomato proteins were found in the greatest frequency in the CnrRR variety. Over 36% of all fungal proteins and 19% of tomato proteins identified were unique to the CnrRR strand supporting previous research that indicated pathogen susceptibility in the *B. cinerea*-tomato interaction increases with ripening.

An Investigation of the Metabolic Changes Associated with Feeding a High-Fat/High-Sugar Diet in Swine

Emily Vermillion, CURO Honors Scholar
Dr. Robert Dove, Animal & Dairy Science, College of Agricultural & Environmental Sciences

The bio-medical community has expressed interest as to what types of changes might be seen in pigs fed high-fat, high-sugar diets. A pilot study was conducted to determine the metabolic changes in pigs fed high fat/high sugar diets. A total of 9 pigs were assigned to the study, with 6 pigs assigned to the experimental diet (2 pens), and 3 pigs assigned to a control diet (1 pen). The experimental

diet contained 20% fat, and 20% sugar and the control diet was formulated to meet NRC guidelines. Pigs were fed the diets for 12-16 weeks in amounts equal to approximately 70% of ad libitum intake. Pigs were weighed weekly and bled via a jugular stick on days 1, 28, 56, 84, 98, and 112. Blood samples were analyzed for glucose, triglycerides and insulin. Week 6 weights indicate that the pigs fed the experimental diet exhibited the expected weight gain, averaging 9 pounds heavier than pigs fed control diet. Triglyceride and glucose levels showed little variation between groups. On weeks 12, 14, and 16, one pig from each pen was harvested, and the heart, liver, kidney, and pancreas were collected for analysis. Livers of the experimental pigs weighed an average 300g more than the livers of the control pigs. Additionally, some liver streaking was noted in pigs fed the experimental diet, indicating possible early onset of fatty liver disease. Results of slaughter may indicate early onset of metabolic syndrome-type symptoms, however triglyceride levels show little evidence of this.

Mutations Impacting Copy Number Control and Host Cofactor Involvement in Retrotransposition of Ty1

Lucas Wachsmuth
Dr. David Garfinkel, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Ty1 is an LTR retrotransposon found in the yeast genus *Saccharomyces* that replicates via a process similar to that observed in retroviruses. Ty1 is comprised of two open reading frames: *GAG*, which encodes the structural capsid-like protein, and *POL*, which codes for the Ty1 protease (PR), integrase (IN), and reverse transcriptase (RT). Ty1 proteins along with Ty1 mRNA assemble into virus-like particles (VLPs), where the Ty1 mRNA is reverse transcribed into cDNA for insertion into the genome. Ty1 replication in the budding yeast host exhibits a phenomenon where transposition decreases as the number of Ty1 genomic copies increases, a process called copy-number control (CNC). In order to learn more about the mechanism of CNC we performed a mutant screen using error-prone PCR to identify CNC-resistant Ty1 *POL* mutants. In the mutants we identified, PR V115A and IN D391G/RT R288G, we measured transposition frequency and examined steady state protein levels. Additionally, to learn more about host factor involvement in Ty1 retrotransposition, we conducted a screen using a GAL1-regulated yeast cDNA expression library to identify host cofactor genes that are involved in the life cycle of Ty1. From these experiments we isolated two host cofactors, YRB1 and BMH2, that, when overexpressed, inhibit Ty1 retrotransposition. As the Ty1 proteins are homologs of retroviral Gag and Pol, by studying Ty1 transposition we can expand our understanding of the replication of other retroelements, an area that has important implications for human disease.

Ectopic Endodermal Expression of Foxn1 in a Murine Model

Lucas Wachsmuth
Dr. Nancy Manley, Genetics, Franklin College of Arts & Sciences

Foxn1 is a forkhead transcription factor that drives differentiation of the epithelial cell lines in the thymus, the organ responsible for maturation and selection of T cells. Normal expression of Foxn1 is crucial for proper thymic development and postnatal upkeep of thymic cellular organization, and expression defects lead to severe immunodeficiency due to impaired T cell colonization and maturation. Foxn1 has been described as a master regulator of thymic epithelial cell lineage due to its role in thymic epithelial cell patterning as an activator of downstream epithelial differentiation genes. The thymus arises from endoderm in the third pharyngeal

pouch, so it follows that Foxn1 expression in other endodermal tissues could have the potential to alter cell fates. However, Foxn1 expression is primarily localized to the pre-thymic areas, and the potential for Foxn1 to function as an endodermal transcription factor outside of the pharyngeal pouch has yet to be analyzed. Here we show that ectopic Foxn1 expression can be induced through the FoxA2CreER system and an inducible Foxn1 transgene in a murine model. Using this genetic approach we induce Foxn1 expression under the control of the FoxA2 gene, resulting in ectopic endodermal Foxn1 expression. Studying the development of these Foxn1-expressing cells located in endodermal tissues outside of the thymic primordium will further our understanding of the scope of Foxn1's effects on endodermal tissues. With more knowledge of Foxn1's involvement in cellular differentiation we can expand our understanding of its role in aspects of health such as age-related immune decline and immunodificiencies.

Cell Cycle Regulation of BMP Signal Transduction

Akshey Walia
Dr. Jonathan Eggenschwiler, Genetics, Franklin College of Arts & Sciences

Bone morphogenetic proteins (BMPs), belonging to the transforming growth factor beta (TGF-β) family of ligands, are thought to be responsible for a variety of developmental processes within the mammalian central nervous system, including neurulation, dorsal-ventral patterning, cellular differentiation, survival, and proliferation. Although BMP signaling plays an important role in cell cycle regulation, it is unclear whether the opposite relationship, in which the BMP pathway is active in only a specific phase of the cell cycle, also exists. To investigate this possibility, I have developed a quantitative assay using qPCR to detect unspliced pre-mRNA messages from direct target genes. Pharmacological inhibition of transcription will be used to determine the half-life of these messages. Next, cells will be sorted according to cycle phase using flow cytometry. I will then assess real time transcription of target genes as a function of cycle phase using housekeeping gene expression as an internal control. The possibility that cell cycle phase is differentially correlated with BMP target gene expression would argue that the BMP pathway both regulates and is regulated by the cell cycle. Insight regarding the BMP pathway with respect to cell cycle phase would have important implications with respect to the etiology and treatment of developmental and oncological pathologies associated with BMP signaling.

The Effect of the Protein Ras2 on the Biological Clock of the Fungus *Neurospora crassa*

Solomon Walker
Dr. Jonathan Arnold, Genetics, Franklin College of Arts & Sciences

The biological clock of most organisms is a complex interactome of many proteins that can control the various pathways and functions within an organism that relate to circadian rhythms. It is already known that a defect in the Ras2 gene in *Neurospora c.* causes conidal and cell wall growth defects, but it is not known if the gene has any effect on its biological clock. We utilized viability tests and growth tube tests of Ras2 knockout strains compared to wild type strains to analyze the defects caused by the absence of the Ras2 on the life span of individual conidia and core functions seen in other knockout strains, such as the banding seen in growth tube tests of Ras1 mutants. We also performed real-time PCR on aged and unaged cultures of Ras2 knockout and wild type strains to determine if the low expression in Ras2 knockout strains of Ras2 affects the expression levels of another key clock gene, frq, which could implicate Ras2 in being part of the clock

interactome. So far, the viability and growth tube tests remain inconclusive, but the upcoming real-time PCR tests could give more concrete results on whether or not Ras2 is a key gene in the clock regulation of *Neurospora crassa.*

Concussions from the Past Continue to Predict Present Symptomology Above and Beyond Mood Symptoms

Tiffany Washington
Doug Terry, Graduate student
Dr. L. Stephen Miller, Psychology, Franklin College of Arts & Sciences

Objective: Much research has been done in order to understand the consequences and impact concussions can have on professional football players such as the chronicity of symptoms associated with a concussion. However, there is limited research that assesses the long lasting impacts of a concussion on individuals who played football solely during their adolescence. Studies suggest that mood symptomology may be associated with history of concussions. Thus, we examined the relationship between depression and anxiety and concussion-like symptoms in individuals who have not had a concussion in many years. Moreover, we examined the addition of a third variable, number of past concussions, to see if it could further predict concussive-like symptoms. *Methods:* Twenty-eight community-dwelling former high school football players ages 40-65 participated in this study. The Beck Depression Inventory-II and Beck Anxiety Inventory as well as a measure of current concussive symptoms were completed. Participants also underwent the Acute Concussion Evaluation (ACE), semi-structured interview to assess how many previous concussions they endured. To find an association between the independent and dependent variables a hierarchical linear regression model was used in order to analyze the scores. *Results:* As expected, depression and anxiety contributed to explaining a significant amount of variance of self-reported concussion-like symptoms. Depression explained 30% of current concussive-like symptoms. Also, as predicted, the number of past concussions further predicts current concussion-like symptoms above and beyond mood symptomology. Adding the number of past concussions into the model explained a total of 39% of that variance in concussion-like symptoms. *Conclusion:* Predictably, an individual's current mood contributes to explaining variance in concussion-like symptoms. However, the number of past concussions was significantly related to concussive-like symptoms above and beyond one's mood symptomology in individuals who do not currently have a concussion. This study suggests that getting a concussion in one's adolescent years may have long lasting effects in one's adult years.

Mimicking the EGFR Dimerization Arm Using Triazolyl-Bridged Peptides: An Alternative Approach to EGFR Inhibition

Christopher Watkins
Dr. Eileen Kennedy, Pharmaceutical & Biomedical Sciences, College of Pharmacy

EGFR is a transmembrane receptor tyrosine kinase whose overexpression contributes to oncogenic phenotypes in multiple cancers, making it a candidate of choice for therapeutic treatments. Previous attempts have mostly relied on tyrosine kinase inhibitors (TKIs) and monoclonal antibodies, but these have had significant drawbacks, such as the development of secondary resistance and infusion reactions, making an alternative targeting strategy necessary. Our work has been to develop a library of triazolyl-bridged peptides that inhibit EGFR activity by mimicking the dimerization arm of its extracellular domain. The dimerization arm was chosen because blocking its interaction prevents dimerization of the receptor and the activation of the cytoplasmic tyrosine kinase

domain of EGFR, thus inhibiting downstream signaling. Our peptides were stabilized by locking the termini together into a β loop by formation of a triazolyl bridge. The lengths of the azido-amino acid side chains required for triazole formation were varied to identify the optimal cross-link length. Liquid chromatography-mass spectrometry (LC/MS) confirmed formation of the cyclized product, and reverse-phase high-pressure liquid chromatography (HPLC) was used to purify the peptides. The peptide with the shortest bridge, EDA2, showed the greatest decrease in the amount of phosphorylated EGFR and Akt in cell-based assays. Co-immunoprecipitation of fluorescein-labeled peptides revealed that our EDA2 peptide bound EGFR. The Duolink assay identified a decrease in EGFR dimers after incubation with EDA2. Our results show that EDA2 inhibits the dimerization of EGFR and subsequent downstream signaling, demonstrating that dimerization arm mimicking peptides may be a promising alternative targeting strategy for EGFR inhibition.

Polio Eradication: What's Still Needed?
Amelia Watson
Dr. Richard Schuster, Health Policy & Management, College of Public Health

Poliomyelitis is a devastating disease that attacks the central nervous system and often causes paralysis. About 2 to 5% of children and 15-30% of adults with paralyzing infection die, and the survivors' lives are irrevocably changed. The World Health Assembly sought to eradicate poliomyelitis in 1988, when the disease paralyzed more than 350,000 people each year. The most recent deadline of polio eradication, one of the many set, was missed in 2012. Unfortunately, polio is still endemic in three countries despite continual efforts towards eradication. The current state of control would cost more than ten billion dollars over the next 20 years with approximately 200 cases of paralytic polio each year, and circulating polio will threaten to have even larger outbreaks, affecting the health of the world. Because of vaccination refusals and security problems as well as the need for a new vaccination schedule, the policies put in place must be reassessed. Introducing IPV into every vaccination schedule is an important step in polio eradication's future. The challenges of this policy are that implementation is expensive and requires the intensive training of vaccination workers compared to OPV. However, this solution will increase demand for the vaccine, be more politically accepted, and prevent the most cases of polio.

Breaking Mendel's Laws: How Abnormal Chromosome 10 Causes Meiotic Drive
Amy Webster
Dr. Kelly Dawe, Genetics, Franklin College of Arts & Sciences

In *Zea mays*, abnormal chromosome 10 (Ab10) exhibits meiotic drive by segregating into approximately 80% of progeny instead of the Mendelian 50%. In addition to preferentially segregating itself, the presence of Ab10 causes the preferential segregation of certain knobs present on other chromosomes. These knobs are heterochromatic regions of tandem repeats composed of two sequences called Knob 180 and TR-1. Three haplotype variants of Ab10 have been found across subspecies of *Zea mays*, called teosintes, the wild progenitor of domesticated maize. They are denoted types I, II, and III and vary in knob content, but all exhibit meiotic drive. My goal was to determine which lines of teosinte have Ab10, which variant of Ab10 is present in each, and which genes are important for the meiotic drive phenotype. To do this, I found six lines of teosinte that have Ab10 present in at least one plant. I used fluorescent *in situ* hybridization (FISH) to probe for centromeres, TR-1 knob, and Knob180 on the chromosomes of teosinte lines, and

determined the type of Ab10 present in three plants positive for Ab10 using fluorescent microscopy. I genotyped *Zea mays* for the presence of ten genes on the distal tip of Ab10 to determine if they are present across teosintes and used qRT-PCR to compare expression levels of plants with functioning versus mutant Ab10. Through these experiments, I found one gene that is not important for meiotic drive and two genes that have significant changes in expression and are of interest for further study.

The Justification for Ethnic War
Patrick Wheat
Dr. Daniel Hill, International Affairs, School of Public & International Affairs

With a strong increase in ethnically focused conflicts in the past twenty years, the root of these conflicts remains a confounded issue in many respects. Through the use of analysis of case studies, along with dynamic and structural theories on the foundation of ethnic identity, I attempted to form a conclusion as to the core cause of ethnic conflict. While in many cases it appears that the actions of individuals who participate in ethnic conflicts appear to be the result of long-standing grievances, violence is more likely to be the result of manipulation of ethnically-based political cleavages by individuals in leadership positions, who engage in such behavior for the advancement of their own personal agenda or that of their ethnic or political bloc. Furthermore, these efforts are more successful when the leadership is able to manipulate ethnically-based cleavages characterized by a history of grievances. In this presentation, I will use the real world examples of the events leading up to the Rwandan Genocide, the Bosnian Civil War and the Sri Lankan Civil War alongside theoretical analysis of different theories on Ethnic Conflict to demonstrate the cause of this type of conflict as more likely to be the result of leadership manipulation rather than other factors, including Ethnic strife and "Ancient Hatreds" arguments.

The Rationality of Peacekeeping
Patrick Wheat
Dr. Andrea Everett, International Affairs, College of Public & International Affairs

The United Nations Department of Peacekeeping Operations has acted as one of the most well-known international organizations for the past sixty years, taking part in 67 operations aimed at stabilizing regional conflict and alleviating humanitarian concerns across the globe. Peacekeeping missions organized by the DPKO are comprised entirely of voluntary contributions of soldiers from individual nations. Because these contributions play such an important role in the DPKO's continued operations, understanding the factors that are likely to encourage or discourage states from participating in UN missions is of paramount importance. One of the most interesting aspects of this contribution question is understanding the factors that cause states with fewer military resources (personal, weapons, equipment, etc.) to contribute more than states with a large amount of resources. Most of this motivation appears to come from political will within the nation and from the financial compensation given from the UN to states who contribute forces to peacekeeping mission. If either of these factors is either lacking or unnecessary to the government of a state, the state is less likely to contribute based on this model. To demonstrate this, I will use case studies from nations such as Bangladesh, Ethiopia, Cambodia and Thailand.

Abstracts

The Utilization of Genetic Manipulation to Better Understand Kinative Function of CK1.2 in *Trypanosoma brucei*

Zachary Whitt, CURO Graduation Distinction
Prof. Kojo Mensa-Wilmot, Cellular Biology, Franklin College of Arts & Sciences

Human African Trypanosomiasis (HAT) is a disease caused by two subspecies: *Trypanosoma brucei gambiense* and *rhodesiense*. The drugs Pentamidine, Suramin and Melarsoprol have all been used for over 60 years to treat Trypanosomiasis; however, each has undesired, potentially fatal side effects. Over the past few decades, governments and international agencies have been pushing for safer and more effective treatments for HAT. To this end, the Mensa-Wilmot lab has identified AEE788, an epidermal growth factor receptor (EGFR) inhibitor, as a lead for anti-trypanosome drug discovery. Trypanosomes lack EGFR but AEE788 binds Casein kinase 1.2 (TbCK1.2) in the parasite. The biological functions of TbCK1.2 are not known. One approach to address the issue is to overexpress TbCK1.2 in *T. brucei*, and examine the genetically modified trypanosomes for new phenotypes. We are interested in learning whether the effects of AEE788 treatment of *T. brucei* is similar to overexpression of TbCK1.2. Overexpression of TbCK1.2 leads to a defect in segregation of a specific organelle, the kinetoplast which contains mitochondrial DNA in the parasite. We anticipate that elucidation of these pathways may lead to discovery of new targets for hit discovery in anti-trypanosome drug discovery.

The Expression of the Bile Acid Receptor TGR5 in Prostate Cancer Cells and its Role in Bile Acid-Induced Cell Death

Stephanie Wilding, CURO Summer Fellow, CURO Graduation Distinction
Dr. Brian Cummings, Pharmaceutical & Biomedical Sciences, College of Pharmacy

Bile acids mediate the digestion and absorption of fats and fat-soluble vitamins; however, pathological increases are associated with choleostasis and cell death. Recent studies show that high concentrations of bile acids can induce apoptosis in several cells, including cancer cells, by mechanisms that are not fully understood. Previous data in our lab demonstrated the novel finding that bile acids can induce cell death in three prostate cancer cell lines (PC-3, DU-145, and LNCaP); however, they do not determine the mechanisms involved. Bile acids are transported into cells by receptors, one of which is TGR5. Thus, we hypothesized that bile acid-induced cell death was mediated by TGR5; however, the expression of TGR5 in prostate cancer cells has not been reported. We used RT-PCR and immunoblot analysis to show that TGR5 is expressed in all three prostate cancer cell lines as well as a non-cancerous prostate cell line (RWPE-1). In general, the expression of TGR5 was highest in prostate cancer cells, and lowest in non-cancerous prostate cells. Transfection of PC-3 cells with plasmids encoding for shRNA against TGR5 decreased TGR5 mRNA and protein expression, as compared to cells transfected with scrambled shRNA. Analysis of MTT staining, a marker of cytotoxicity, showed that bile acids induced similar levels of cell death in wild-type cells as in TGR5 knockdown cells. These data show the novel finding that TGR5 is expressed in prostate cancer cells, but also suggest that TGR5 does not mediate the toxicity of bile acids.

The Role of Notch Signaling in Astrocyte and Oligodendrocyte Derivation

Elizabeth Wilkins, CURO Honors Scholar, CURO Summer Fellow
Dr. Steven Stice, Animal & Dairy Science, College of Agricultural & Environmental Sciences

Astrocytes and oligodendrocytes are macroglial cell subtypes which play supporting roles for neurons in the central nervous system. During development, the ventral neural tube is spatially patterned into five specific domains by a gradient of Sonic Hedgehog from the floor plate and notochord. Temporally, the p2 progenitors sequentially generate interneurons followed by astrocytes, while the pMN progenitors produce motor neurons then oligodendrocytes in a process known as the glial switch. Notch-Delta signaling is a well-studied means of juxtacrine communication between cells and its downregulation has been implicated in this process, but its mechanism is poorly understood. We plan to investigate the role of Notch signaling in the glial switch. Embryoid bodies composed of mouse embryonic stem cells will be patterned using a SHH agonist to mimic the neural tube. At different time points, a global Notch inhibitor, DAPT, will be added to the media. We will use immunocytochemistry to image for astrocytic and oligodendritic markers. We hypothesize that Notch inhibition will yield greater amounts of secondary cell types, including astrocytes and oligodendrocytes. By understanding how progenitor populations are able to produce multiple cell types, we will better understand the developing neural tube and spinal cord, with implications for motor control diseases like amyotrophic lateral sclerosis and spinal cord injury. Moreover, understanding how progenitor populations generate post-mitotic cell types is highly translatable to other stem and progenitor cell niches which persist into adulthood. The knowledge gained could allow us to harness the capacity of these intrinsic progenitors for potential therapies.

Sigma-54 Promoter Activity and Gene Regulation in *Salmonella*

Leah Williams
Dr. Anna Karls, Microbiology, Franklin College of Arts & Sciences

Sigma factors interact with RNA Polymerase for recognition of promoters and initiation of transcription in prokaryotic organisms. Sigma-54 (RpoN) is an alternative sigma factor that regulates a subset of transcripts and functions in a mechanistically different manner than other known sigma factors, requiring an activator and ATP hydrolysis. To characterize the RpoN-dependent regulon of *Salmonella typhimurium*, we previously utilized chromatin Immunoprecipitation coupled with high-density tiled microarray and RNA microarray assays, defining >250 RpoN chromosomal binding sites and 22 RpoN-dependent transcripts, respectively. In addition, several operons were found to be down-regulated in the presence of RpoN and had adjacent or internal RpoN-binding sites. We are currently addressing the mechanism by which the RpoN binding sites may be negatively regulating the associated operon. Promoter activity for these sites is being assessed by transcriptional fusion to *phoA,* an alkaline phosphatase, in the presence of DctD250. We have adapted a protocol to assay production of PhoA and confirmed that the assay could be performed in *Salmonella.* Transcription fusions to *phoA* are being generated for five of the identified regulatory RpoN binding sites. PhoA activity is being assessed in wild-type and ⊿*rpoN* 14028s strains to ensure PhoA production is RpoN-dependent. Evaluation of these potential promoters will offer insight into possible alternative methods of RpoN-dependent transcriptional and post-transcriptional control of gene expression in *Salmonella.*

Abstracts

Fermentation of Cull Peaches Using a Pectinase Producing *Saccharomyces cerevisiae* Strain

Travis Williams, CURO Summer Fellow
Dr. Joy Doran Peterson, Microbiology, Franklin College of Arts & Sciences

Cull or spoiled peaches, normally a waste product, can be fermented to produce ethanol due to their high concentration of sugars in monomeric and in polymeric form. The sugar polymers in the peach biomass require enzymes for cleavage into available monomers. This set of experiments compared the fermentation performance of a pectinase producing yeast, *Saccharomyces cerevisiae* 09448, to the commonly used corn ethanol production yeast, *Saccharomyces cerevisiae* XR122N, and the engineered ethanologenic bacterium, *Escherichia coli* LY40A. First, *S. cerevisiae* XR122N fermentations were compared to fermentations with *E. coli* LY40A. Due to the high number of six carbon sugars in peaches, the biomass was best fermented by the *S. cerevisiae* XR122N. Next, the optimal enzyme loading for *S. cerevisiae* XR122N fermentations was studied using 15% w/v peach pomace and varying amounts of commercial enzymes. The lowest enzyme loading which produced the maximum amount of ethanol was 1.88 FPU of cellulase/g dw, 7.50 PGU of pectinase/g dw, and 6.25 CBU of cellobiase/g dw. *S. cerevisiae* XR122N fermentations with the same enzyme loading minus the pectinase yielded significantly less ethanol than the fermentation with pectinase. Finally, two sets of fermentations with *S. cerevisiae* 09448 were performed just as they were with the *S. cerevisiae* XR122N in the previous experiment. *S. cerevisiae* 09448 produced the same amount of ethanol in experiments with and without pectinase, indicating that the pectinase produced by *S. cerevisiae* 09448 was sufficient to completely replace commercial pectinase and maintain maximum ethanol yield in peach fermentations.

Interactions between Neutrophils and *Pseudomonas aeruginosa* Flagellum

Matthew Winn
Dr. Balazs Rada, Infectious Diseases, College of Veterinary Medicine

Neutrophil granulocytes are professional phagocytes providing the first line of defense against invading bacterial pathogens. Recently, a novel antimicrobial mechanism of neutrophils has been described: formation of neutrophil extracellular traps (NETs) composed of a DNA backbone decorated with granule enzymes. NET formation is an innate immune mechanism, but uncontrolled NET release can cause tissue damage associated with inflammatory diseases including cystic fibrosis (CF). CF airways are characterized by mucus hypersecretion, chronic bacterial infections and infiltration of neutrophils incapable of fighting bacteria, instead causing airway tissue damage. We seek to elucidate the interactions between neutrophils and *Pseudomonas aeruginosa*, an opportunistic gram-negative bacterium found in CF airways. Specifically, we focus on the role of *P. aeruginosa* flagellum, an organelle responsible for swimming motility and virulence. Interactions of neutrophils with flagellum are studied using the PAO1 laboratory strain, comparing response to wild-type PAO1 with response to flagellum-deficient DfliC PAO1. Compared to wild-type PAO1, DfliC PAO1 induces less activation of microbicidal pathways, such as phagocytosis and superoxide production, and induces decreased release of two neutrophil granule proteins, myeloperoxidase (MPO) and human neutrophil elastase (HNE). DfliC PAO1 induces less NET formation measured as release of extracellular DNA, MPO-DNA and HNE-DNA complexes. Interestingly, blocking Toll-like receptor 5, the main receptor for flagellin, does not seriously affect PAO1-induced neutrophil response, and purified flagellin does not elicit NET generation. These data indicate that the bacterial flagellum is vital for efficient human

neutrophil response to *Pseudomonas aeruginosa,* and interactions are mediated by mechanisms other than TLR5.

TLF2 Synthesis from Oxidized Lipids in TLF1

Christopher Witt
Dr. Stephen Hajduk, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Trypanosome Lytic Factor-1 (TLF1) and the more recently discovered TLF2 are both High Density Lipoproteins (HDLs) found in human serum. Each of these particles functions independently as part of innate human immunity through lysis of the bloodstream form of the protozoan parasite, *Trypanasoma brucei brucei*. TLF1 is the most highly characterized of these two HDLs and is distinguished from non-lytic HDLs by the presence of apolipoprotein L-1 (ApoL-1) and Haptoglobin related protein (Hpr). TLF2 also has ApoL-1 and Hpr but is twice as dense due mainly to the presence of bound IgM molecules which are not found in TLF1. Via Hpr, both TLF1 and TLF2 bind Hemoglobin (Hb). The mechanism of synthesis for TLF2 is unknown. Innate IgM molecules have been shown to bind oxidized phospholipids. Our model proposes that the lipids in Hb bound TLF1 (TLF1-Hb) are oxidized in the bloodstream, inducing recruitment of IgM, ultimately resulting in TLF2 synthesis. The purpose of these experiments was to use the TBAR assay method to demonstrate in vitro lipid peroxidation in TLF1-Hb. TLF1-Hb was shown to self-peroxidize in a time dependent manner at physiological pH in the presence of H2O2. The next step in providing evidence for our model was to demonstrate binding of innate IgM to peroxidized TLF1-Hb via immunoprecipitation. Further characterization of TLF2 synthesis may provide insight into the dynamics of HDLs and oxidized lipids and the role they play in our innate immune response.

Swath Size in Boa Vista's Bearded Capuchin Monkeys

Leigh Anna Young, CURO Summer Fellow
Dr. Marguerite Madden, Geography, Franklin College of Arts & Sciences

Primate social groups are often considered to be either fission-fusion or cohesive in their social structure. Recent work has shown, however, that primate social structure should be interpreted along a continuum of cohesiveness with fission-fusion and cohesive social groups representing extremes of that continuum. This study analyzed one aspect of the social cohesion of a group of bearded capuchin monkeys (*Sapajus libidinosus*): the spatial spread of the group throughout its home range. Swaths of the capuchin group were observed using a high resolution satellite image and a GPS enabled iPhone with Avenza PDF Maps application. Spatial measures of group cohesiveness, including swatch area, inter-individual distance and group density, were calculated using ArcGIS geographic information systems software. On average, 14 individuals were observed representing 59% of the group. The average swath was 613 square meters and average front-to-back distance was 50.2 meters. This front-to-back distance is similar to that of capuchin monkeys in a rainforest habitat. Spatial cohesion may be consistent across regions for capuchin monkeys, although further testing is necessary to confirm these measurements.

Index of Presenters and Faculty Mentors

Index of Presenters and Faculty Mentors

Index of Presenters and Faculty Mentors

Index of Presenters and Faculty Mentors

Index of Presenters and Faculty Mentors

V

W

Y

Z

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CURO Office
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Table of Contents

CURO

March 30, 2015

Dear Students, Faculty, and Guests,

Welcome to the 15th annual CURO Symposium, UGA's celebration of undergraduate research across the disciplines. Many individuals—administrators, faculty members, staff, graduate students, and, of course, undergraduate students—have collaborated to make the CURO Symposium the premier undergraduate academic event at UGA.

Each year, the Symposium has grown larger, and the 2015 Symposium is the largest to date, with 386 undergraduate researchers communicating their substantial accomplishments to their peers, mentors, and the public at large.

From its inception, the CURO Symposium has showcased research and scholarship in all disciplines. The 2015 Symposium continues that commitment, featuring presenters pursuing 79 different majors from 13 schools and colleges who are conducting research with 258 faculty members from 72 departments. Thus, this two-day event displays UGA's broad and substantial support of research and the invaluable commitment of UGA's administration and faculty to mentoring and providing exceptional learning opportunities for our undergraduates.

Thank you for your continued support of undergraduate research and CURO.

Sincerely,

Dr. David S. Williams, '79, '82
Associate Provost and Director

Dr. Martin P. Rogers, '01, '11
Associate Director

Acknowledgements

Special Assistance for 2015 CURO Symposium

Ms. Kate Belgum	Administrative Associate, External Affairs, Honors Program
Ms. Jami Gilstrap	Administrative Associate, CURO
Ms. Dorothé Otemann	Coordinator of External Affairs, Honors Program
Ms. Amanda Pruitt	Assistant to the Director, Honors Program

Technology Equipment and Support for 2015 CURO Symposium

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Reviewers for 2015 CURO Research Mentoring and Best Paper Awards

Dr. Martin Rogers	Associate Director of CURO & Honors
Dr. David S. Williams	Associate Provost and Director of Honors and CURO

Oral and Poster Session Conveners for 2015 CURO Symposium

Ms. Mary Lee Cunill	Communication Studies
Ms. Laura Fletcher	Presidential Graduate Fellow, Department of Psychology
Ms. Jami Gilstrap	Administrative Associate, CURO
Mr. Steven Honea	Academic Advisor, Honors Program
Ms. Linnea Ionno	Department of Public Administration and Policy
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Ms. Heather Smith	Academic Advisor, Honors Program
Mr. Jeremy Wheatley	Academic Advisor, Honors Program
Ms. Eleana Whyte	Program Coordinator, CURO

Schedule

Monday, March 30, 2015

Oral Session I **11:15 a.m.-12:05 p.m.**
Athena Breakout Rooms A, B, C, D, G, H

Oral Session II **12:20-1:10 p.m.**
Athena Breakout Rooms A, B, C, D, G, H

Oral Session III **1:25-2:15 p.m.**
Athena Breakout Rooms A, B, C, D, G, H

Oral Session IV **2:30-3:20 p.m.**
Athena Breakout Rooms A, B, C, D, G, H

Awards and Keynote Session **3:30-4:30 p.m.**
Athena Room E

Poster Session and Reception **4:30-6:30 p.m.**
Grand Hall South & Atrium (downstairs – use escalator in lobby)

Tuesday, March 31, 2015

Oral Session V **9:30-10:45 a.m.**
Athena Breakout Rooms A, B, C, D, G, H, I, J

Oral Session VI **11:00 a.m.-12:15 p.m.**
Athena Breakout Rooms A, B, C, D, G

Oral Session VII **12:30-1:45 p.m.**
Athena Breakout Rooms A, B, C, D

Oral Session VIII **2:00-3:15 p.m.**
Athena Breakout Rooms A, B, C, D, G, H

Oral Session IX **3:30-4:45 p.m.**
Athena Breakout Rooms A, B, C, D, G, H, I, J

CURO Research Mentoring Awards

The Office of the Senior Vice President for Academic Affairs and Provost and the Honors Program established the CURO Research Mentoring Awards, formerly the EURM awards, in 2001.

These awards recognize outstanding faculty who consistently engage undergraduate researchers through CURO Programming (courses, the symposium, summer fellows, JURO, theses, et al.) and enhance the learning experience of undergraduate researchers at the University of Georgia. Award recipients have provided superior research opportunities and mentoring and have collaborated with undergraduate researchers on publications and presentations at professional conferences.

Before 2014, awards were designated as "Early Career" and "Master Level" and were granted to corresponding faculty ranks.

2015

Dr. Jeb Byers, Professor, Odum School of Ecology

Dr. Erik Hofmeister, DVM, DACVAA, DECVAA, MA (Anesthesia), Associate Professor of Anesthesiology, Chief of Small Animal Surgery and Anesthesia, College of Veterinary Medicine

2014

Dr. Carl Bergmann, Associate Vice President for Research-Facilities; Associate Director, Complex Carbohydrate Research Center; Executive Director, Animal Health Research Center; Senior Research Scientist

Dr. Andrew Owsiak, Department of International Affairs, School of Public & International Affairs

2013

Master Level Faculty Award

Dr. Jennifer McDowell, Department of Psychology, Franklin College of Arts & Sciences

Early Career Faculty Award

Dr. Katalin Medvedev, Department of Textiles, Merchandising & Interiors, College of Family & Consumer Sciences

2012

Master Level Faculty Award

Dr. Lawrence Shimkets, Department of Microbiology, Franklin College of Arts & Sciences

Early Career Faculty Award

Dr. Michael Yabsley, Warnell School of Forestry & Natural Resources

2011

Master Level Faculty Award

Dr. Eric Stabb, Department of Microbiology

Early Career Faculty Award

Dr. John Drake, Odum School of Ecology

CURO Research Mentoring Awards

Program Award
Savannah River Ecology Laboratory
Dr. Kenneth McLeod, Interim Director

2010

Early Career Faculty Award
Dr. John C. Maerz, Warnell School of Forestry & Natural Resources

2009

Early Career Faculty Award
Dr. Brian S. Cummings, Department of Pharmaceutical & Biomedical Sciences
Dr. Anna C. Karls, Department of Microbiology
Dr. Dawn T. Robinson, Department of Sociology

2008

Master Level Faculty Award
Dr. John J. Maurer, College of Veterinary Medicine

Early Career Faculty Award
Dr. Walter K. Schmidt, Department of Biochemistry & Molecular Biology

Program Award
Biomedical and Health Sciences Institute
Dr. Harry S. Dailey, Director

2007

Master Level Faculty Award
Dr. Timothy Hoover, Department of Microbiology
Early Career Faculty Award
Dr. Steven Stice, Department of Animal & Dairy Science

2006

Master Level Faculty Award
Dr. Patricia Hunt-Hurst, Department of Textiles, Merchandising & Interiors
Early Career Faculty Award
Dr. Rodney Mauricio, Department of Genetics
Graduate Student Award
Christopher Anderson, PhD candidate in Ecology
Graduate Student Recognition
Dawn Holligan, PhD candidate in Plant Biology

2005

Faculty Award
Dr. Gary Barrett, Odum School of Ecology
Dr. Sidney Kushner, Department of Genetics
Department Award
Department of Cellular Biology

CURO Research Mentoring Awards

2004

Faculty Award

Dr. William S. Kisaalita, Department of Biological & Agricultural Engineering

2003

Faculty Award

Dr. Jody Clay-Warner, Department of Sociology

Department Award

Department of Microbiology
Dr. Duncan Krause, Department Head
Dr. Timothy Hoover, Undergraduate Coordinator

Program Award

The Pratt Laboratory of Plant Genomics and Bioinformatics
Dr. Lee H. Pratt, Department of Plant Biology
Dr. Marie-Michèle Cordonnier-Pratt, Department of Plant Biology

2002

Faculty Award

Professor William D. Paul, Jr., Lamar Dodd School of Art
Dr. Katherine Kipp, Department of Psychology

Faculty Recognition

Dr. Susan Sanchez, College of Veterinary Medicine

Department Award

Department of Biochemistry & Molecular Biology
Dr. J. David Puett, Department Head

Program Award

"Physics Beyond the Boundaries": National Science Foundation, REU Program
Dr. Loris Magnani, Principal Investigator, Department of Physics & Astronomy
Dr. Heinz-Bernd Schuttler, Department Head, Department of Physics & Astronomy
Dr. Jonathan Arnold, Department of Genetics
Dr. Susmita Datta, Georgia State University
Dr. David Logan, Clark Atlanta University
Dr. William Steffans, Clark Atlanta University

2001

Faculty Award

Dr. Marcus Fechheimer, Department of Cellular Biology

Faculty Recognition

Dr. David MacIntosh, Department of Environmental Health Sciences
Dr. Dean Rojek, Department of Sociology

Department Award

Department of Genetics
Dr. John MacDonald, Department Head

Program Award

Savannah River Ecology Laboratory
Dr. Paul Bertsch, Director

CURO Symposium Best Paper Awards

Since 2001, CURO Symposium Best Paper Awards have recognized excellence in papers developed from work being presented at that year's Symposium.

Applicants may submit in one or more of the following categories: Arts, Humanities and Media; Business; Life Sciences; Physical and Environmental Sciences; Public and International Affairs; Social Sciences; and Technology, Engineering and Math.

Each recipient is recognized at the Symposium's Award and Keynote Session, and each award carries $100 in financial support, generously provided by the UGA Alumni Association. Winners from the 2015 CURO Symposium are listed below.

Arts, Humanities and Media:

Brett Bennett	The Forgotten Radical: Southern Women and the New Left Student Protests of the 1960s

Life Sciences:

Anish Narayanan	Analysis of Cancer Mutations in Protein Kinases using Semantic Web Technologies

Physical and Environmental Sciences:

Timothy Montgomery	*Gracilaria vermiculophylla's* Impacts on Herbivory in Georgia's Coastal Ecosystems

Public and International Affairs:

Sarah Lane	Syrian Civil War Victims Receiving Medical Care in Israel: Humanity in a War Torn Region

Social Sciences:

Joseph Coppiano	Age Related Effects on Brain Activation during Cognitive Control Tasks in Subjects with Schizophrenia

Technology, Engineering and Math:

Emily Wall	Using Artificial Neural Networks to Predict Solar Radiation in Georgia

Program: Monday, March, 30, 2015

Oral Session I: 11:15 a.m.-12:05 p.m.
Athena Breakout Rooms A, B, C, D, G, H

Room A	**Patrick Wheat**	The Enigmatic Country: Analysis of Russian Expansionism in the Modern Age
	Eytan Palte	Democratic Institutions and the Human Right to Health
	Brent Buck	Threat from Abroad, Conflict Within: Border Settlement and Civil War Onset
Room B	**Daniel Kanso**	Republicanism in the American South: From Strom Thurmond to Lindsey Graham
	Zachary Jones	Who Saved Thad Cochran?: Racial Politics and Voter Mobilization in a Deep South Runoff
	Alexandra Lilly	How Did Female Candidates Fare in the 2014 Election?
Room C	**Kelsie Flanigan, Charlotte Goldman, Tyler Stollman**	The Role of Executive Functioning in Adherence for Pediatric Solid Organ Transplant Recipients
	Jerica Bornstein	Examining Communication Patterns and Trait Self-Control Using the Actor-Partner Interaction Model
	Jonathan Dickens	Executive Function Moderates Relationship between Mobility and Functional Independence in Older Adults
Room D	**Christina Ethridge**	Characterization of Leigh's Syndrome Patient Human Induced Pluripotent Stem Cells for Clinical Research
	Sandip Minhas	Purification of Hirano Bodies in *Dictyostelium discoideum*
	Kurt Mueller	Function of Kinesin Proteins in *Toxoplasma gondii*
Room G	**Brittany Whitlock**	Influence of Maternal Diet on the Offspring Gut Microbiota
	Allison Koch	Size Labeling for Infant Clothing: Cultural Perspectives on Childhood Growth
	Whitney Okie	Genetic Determination of Obesity Induced Inflammation and Blood Brain Barrier Alterations
Room H	**Adam Kramer**	Studying the Kinetics of N-glycan Release by PNGase F with MRM Quantitation of the Glycopeptides from Human Serum Glycoproteins

	Danish Singh	Genotype-Phenotype Correlations in POMGNT1 and POMGNT2
	Suraj Kapoor	Characterizing the Novel 1,2-Propanediol Dehydratase and its Activating Enzyme from *Roseburia inulinivorans*

Oral Session II: 12:20-1:10 p.m.
Athena Breakout Rooms A, B, C, D, G, H

Room A	**Minh Nguyen**	A #whitewashed Landscape: Internalized Racism, Linguistic Discrimination, and the Policing of Ethnic Identity on Twitter
	Patrick Semanie	Is Everyone on Twitter Better Than You?: Correlations between Twitter and Exercise Motivation among College Students
	Spencer Hanlin	Describing Scrambling in Japanese
Room B	**Sarah Lane**	Syrian Civil War Victims Receiving Medical Care in Israel: Humanity in a War Torn Region
	Elizabeth Hardister	Hurricane Forecasting and Healthcare Facility Evacuations
	Abby Tyre	Health Care Policy Evaluation: A Case Study Examination of Workplace Wellness
Room C	**Santana Mowbray**	The Effect of Race and Household Structure on Adolescent Alcohol Use
	Elizabeth Wilkes	Reviving Our Roots: Reconnecting Teens to Agriculture
	Emily Maloney, Nneka Ewulonu, Mallory Harris	Reducing Teen Pregnancy: The Case for Comprehensive Sex Education in Georgia
Room D	**Keller Sheppard**	Mitigating the Spatial Mismatch of Social Service Provision and Demand: The Potential of Faith-Based Facilities
	Olivia Stockert	Understanding and Preserving the Practice of Medicinal Plant Cultivation and Use in San Luis, Costa Rica
	Rachael Hart	Investigating Resting State Oscillatory Dynamics Associated with Schizophrenia and High and Low Cognitive Control
Room G	**Scott Smith**	A GDOT Case Study for the Beneficial Use of HVFA in Concrete Pavements

	Delmaries Gonzalez	Development of a Lightweight Weeding Robot
	Thomas McBrearty, Daniel Sanchez, Andrew Angoyar, Carson Aft	Algorithmic Forecasting through Big Data Analytics
Room H	**Jacob Kennedy**	Highly Mobile Kenyan Runners: Transnationalism through Sport
	Morgan Green	Field Test Significance in Adolescents with Chronic Ankle Instability
	Cristian Escalera	Comparison of Spinal Motions Used during Running to Their Spinal Flexibility

Oral Session III: 1:25-2:15 p.m.
Athena Breakout Rooms A, B, C, D, G, H

Room A	**Angel Chen**	Pollen Competition
	Hiral Patel	Understanding Floral Trait Evolution in Wild Sunflowers
	Benjamin Miller	Evolution of Root System Morphology and Nitrogen Uptake in Genus *Helianthus*
Room B	**Christine Kil**	Alleviating Inequities in Georgia's Public School Funding
	Kathryn Mauldin	Changing Cones: Students' Images of a Dynamic Situation
	Rahul Shah	Promoting Success for English Learners: Dual-Language Immersion in Georgia
Room C	**Melissa DeVelvis**	The Importance of Personality and Emotion in Women's Support for Georgia's Secession, 1860-1861
	Caroline Jackson	The Strategy of the Early British Feminist Movement: Emily Davies and Feminist Networks, 1865-1905
	Brett Bennett	The Forgotten Radical: Southern Women and the New Left Student Protests of the 1960s
Room D	**Samantha Harris**	Chief Executive Officers' Personality Characteristics and How These Characteristics Affect Marketing in Their Company

	Anne Chen	Female Labor Force Participation and Wages: What Has Changed in the Last 30 Years?
	Lyndon Lee	Change the Channel: Can Firms Influence Consumer Channel Choice through Marketing Contacts?
Room G	**Tyler Stollman, Charlotte Goldman, Kelsie Flanigan**	The Influence of Caregiver Emotional Functioning on Perceived Barriers and Adherence in Adolescent Solid Organ Transplant Patients
	Dionnet Bhatti	Acute Intra-vmPFC Injections of Galanin Reduce Expression of Conditioned Contextual Threat in Rats
	Joseph Coppiano	Age Related Effects on Brain Activation during Cognitive Control Tasks in Subjects with Schizophrenia
Room H	**Kim Nguyen**	Giving Up Appointment Television: How Millennials Are Changing What It Means to Watch Television
	Haley Vann	Visual Brand Identity on Pinterest
	Sonja Petrovic	Spoken Word Activism in the Age of Social Media

Oral Session IV: 2:30-3:20 p.m.
Athena Breakout Rooms A, B, C, D, G, H

Room A	**Piyush Joshi**	Integrating of Human Neural Progenitor Cells into a Developing Chicken Embryo for a Toxicology Model
	Elizabeth Wilkins, Catherine Callaway	Development of a Chimeric Chick Neural Tube Injury Model incorporating 3D, mESC-Derived Neural Aggregates
	Lindsey Taylor	The Effects of Interval versus Continuous Conditioning on Physiological and Kinematic Parameters of Equine Fitness
Room B	**Joan Han**	The Effects of Size on Development Time and Fecundity in *D. subquinaria*
	Sora Park	Using the Chemical Reporter Strategy to Analyze Glycoproteins in Pompe Disease
	Lauren Dennison	Extracellular Vesicle Dependent Transfer of a Virulence Factor Confers Human Infectivity to *Trypanosoma brucei brucei*

Room C	**Hannah Weiss**	Does Georgia's Voter Identification Law Disproportionately Affect African American Voter Turnout in Georgia?
	Kasey O'Brien	The Effects of Incumbent and Challenger Campaign Spending on Election Results
	Aaron Conley	The Politicization of Soccer in Brazil, and the Effect of the 2014 FIFA World Cup on Brazilian Politics
Room D	**Samuel Baxter**	Progression of Lithium Ion Batteries
	Heather Huynh	Increasing Adoption of an Internet Standard: Internet Protocol Version 6
	Andrew Martin, Paul Cray	Expanding Polymer Usage for 3D Printing in Tissue Engineering
Room G	**Benjamin Landes**	Financial Literacy in College Students
	Victoria Glover	Examining Perceptions and Expectations of African American Faculty and Students
	Jillian Maloney, Cara Smith, Mackin D'Amico	Perception of Student-Athletes on UGA's Campus
Room H	**Audrey Wright**	Investigating Interest in Ingesting Insects
	Johnathan Mayfield	The Effects of TnAV-2a on the Complex Interactions between the Parasitoid *Microplitis demolitor* and Various Lepidopteran Species
	Daniel Skowronski	Profiling the Spatiotemporal Regulation of DNA Methylation in a Social Insect

Awards and Keynote Session: 3:30-4:30 p.m.
Athena Room E

Welcome and Introductions	Dr. David S. Williams, Associate Provost and Director of Honors and CURO
Remarks	UGA President Jere W. Morehead
Introduction to Awards	Dr. Martin Rogers, Associate Director of CURO & Honors
CURO Research Mentoring Awards	Dr. David C. Lee, Vice President for Research

Program: Monday, March, 30, 2015

2015 Symposium Best Paper Awards	Dr. Rahul Shrivastav, Vice President for Instruction Mrs. Meredith Gurley Johnson, Executive Director, UGA Alumni Association
UGA Libraries' Research Awards	Mrs. Caroline Barratt, Librarian, UGA Libraries
Keynote Address	Dr. Sonia Altizer, Associate Dean of Academic Affairs & UGA Athletic Association Professor of Ecology, "Infectious Diseases on a Changing Planet: How Ecology Drives Epidemics"
Closing Comments	Dr. David S. Williams, Associate Provost and Director of Honors and CURO

Poster Session and Reception: 4:30-6:30 p.m.
Sponsored by the Office of the President
Grand Hall South & Atrium (downstairs – use the escalator in the lobby)

Poster # 1	**Carson De Mille**	The Effects of Dietary Wheat Gluten on Swine and Poultry Growth Performance
Poster # 2	**Mary Mehegan**	Concussive Traumatic Brain Injury Therapy Using iPSC-NSCs in a Porcine Model
Poster # 3	**Nicole Bisel**	The Role of Chondroitin Sulfate Glycosaminoglycans in Glioma Cell Progression
Poster # 4	**Hannah Mason**	Elucidating the Functional Role of Chondroitin Sulfate Proteoglycans in the Extracellular Matrix for Use in Rationally Designed Glycomaterials
Poster # 5	**Karishma Sriram**	Bone Fracture Putty: A Combined Stem Cells and Lentiviral Approach
Poster # 6	**Courtni Young**	The Effect of Anesthetic Variables on Patient Outcome
Poster # 7	**Katherine Hogan**	Investigating Heat Treatment of Serum and Plasma Samples as a Means to Improve the Detection Sensitivity of Heartworm Diagnosis in Dogs
Poster # 8	**Susan Jones**	PCR Detection of SRY Gene of Male Dog Mesenchymal Stem Cells in Female Dog Brains with Acute Ischemic Stroke
Poster # 9	**Nina Navalkar**	Investigating the Influence of Rac1 and Rho Family GTPases in Hair Follicle Biology
Poster # 10	**Eric Malaney**	Mammary Gland Specific Deletion of Rac1 on MMTV-

Poster # 11	**Ijeoma Okoye**	Examining the Digestibility of Methionine in Poultry
Poster # 12	**Christian Kim**	Identifying Virulence Genes Associated with Emergent *Avibacterium paragallinarum* Isolates Associated with Acute Endocarditis in Chickens Using a Bioinformatic Approach
Poster # 13	**Melissa Jennings**	Biosynthesis of Base J
Poster # 14	**Megha Kalia**	Mechanism of Developmental Regulation of Base J Synthesis in *Trypanosoma brucei*
Poster # 15	**Brian Windle**	Characterization of the Inositol Hexakisphosphate Kinase (IP6K) of *Trypanosoma brucei*
Poster # 16	**Stacey Ikebudu**	Upregulation of Transferrin Receptor in *Trypanosoma brucei*
Poster # 17	**Bryan Aguanta**	Subcellular Localization of a Regulator of Transferrin Endocytosis in *Trypanosoma brucei*
Poster # 18	**Nathan Howell**	Apicoplast Function in *Plasmodium falciparum*
Poster # 19	**Brandon Sims**	The Role of the Chaperone-Protein Interactions in Driving Protein Trafficking in the Malaria Parasite
Poster # 20	**Omar Martinez-Uribe**	Effects of Tempol, a Superoxide Dismutase Mimetic, in Alleviating *Plasmodium chabaudi* Oxidative Stress during Pregnancy
Poster # 21	**Zil Ali**	Effect of Tumor Necrosis Factor on Placental Malaria in B6 and TNF Receptor Knockout Mice
Poster # 22	**Ha Truong**	The Effects of TNFR1 and TNFR2 on Low Birth Weight as Seen in Malaria-Infected Mice Models
Poster # 23	**Kerryn Roome**	Fetal Outcome of Pregnant C57BL/6 Mice Infected Late Pregnancy with 10^3 *Plasmodium chabaudi chabaudi* AS
Poster # 24	**Caleb Studstill**	Cryptosporidiosis: New Methods for Combating an Important Disease
Poster # 25	**Jennifer Hardister**	Localization of Rv3351c Protein in *Mycobacterium smegmatis* and BCG
Poster # 26	**Ashitha Rajeurs**	Surveying *Mycobacterium tuberculosis* Gene Function by Complementation

Poster # 27	**Jaclyn Speer**	Development of an Improved Tuberculosis Vaccine
Poster # 28	**Preston Samowitz**	Evaluation of Novel Antiviral Drug NSC95397 for Treatment of Swine Influenza Infections in Pig Cells
Poster # 29	**Michael Cheng**	*S. cerevisiae* as a Model System for the Oligomerization and Aggregation of Aβ Peptides using Cup1p as a Reporter
Poster # 30	**Jesse Hu**	Design of Novel Reporters for Monitoring CaaX Proteolysis
Poster # 31	**Colby Samuelson-Ruiz**	Functional Consequences of Different CAAX Motifs
Poster # 32	**Sarah Evans**	Effect of O-GlcNAc Expression on Cancer Stem Cells and the Role of LGR6
Poster # 33	**Anish Narayanan**	Analysis of Cancer Mutations in Protein Kinases using Semantic Web Technologies
Poster # 34	**Samuel Kennedy**	Nano Formulation of Platin-A and Associated Inflammation
Poster # 35	**Nivita Sharma**	Formation of Mitochondria-Targeted Blood Brain Barrier Penetrating Biodegradable Nanoparticles for Stroke Treatment
Poster # 36	**Sheela Sheth**	Role of Glypican-1 in Prostate Cancer Cell Growth
Poster # 37	**Maria Orlando**	Analysis of the Effects of High-Fat and Low-Fat Diets on Blood Lipid Profiles
Poster # 38	**Mugdha Joshi**	Role of RGS10 in Regulating Neuroinflammation in Microglia
Poster # 39	**Seema Mustafa**	Carbohydrate T cell Recognition and Presentation
Poster # 40	**Hammad Khalid**	O-Linked Glycosylation Patterns at the Interface of Cervical Mucins and HIV Infection
Poster # 41	**Leah Caplan**	Genetic Interactions between Pigmentation Pathways and Protein Glycosylation
Poster # 42	**Rachel Vecchione**	Analysis of Heparan Sulfate Fragments by NMR Spectroscopy
Poster # 43	**Anoosh Bahraini**	Locating a Suppressor Gene for the LF4 Protein

Poster # 44	**Pei-Ying Chang**	Ultrastructural Change in the Mitochondria of *Euglena gracilis* Grown in Progressively Anaerobic Conditions
Poster # 45	**Jeffery Lanier**	Identification of the Mechanism for Ciliary Gliding in Heterotrophic Euglenids
Poster # 46	**Spencer Robinson**	Regulation of Mitochondrial Dynamics in *C. elegans*
Poster # 47	**Linda Egbosiuba**	Purification of Endopolygalacturonase from *Aspergillus niger*
Poster # 48	**Heather Steckenrider**	The Effects of a Fucosyltransferase 3 (FUT3) Gene Knockout in *Arabidopsis thaliana*
Poster # 49	**Fatai Olorunsola**	Investigating the Cell Walls of *Arabidopsis thaliana* Organs using Screenings with Glycan-directed Monoclonal Antibodies and Electron Microscopy
Poster # 50	**Chederli Belongilot**	Investigating Regulation of Germline Stem Cell Division Frequency in *Drosophila melanogaster*
Poster # 51	**Kip Lacy**	Factors Influencing Gut Microbial Community Structure in Mosquitoes
Poster # 52	**Maha Khan**	The Impact of Sugar during Larval Development on Growth Rate, Energy Stores, and Behavior
Poster # 53	**Kathryn Clark**	Introgression of a *Wolbachia* Infection into a Non-Native Host
Poster # 54	**Randall English**	Male Mate Choice between Sympatric and Allopatric Populations of *Drosophila subquinaria* and *Drosophila recens*
Poster # 55	**Sarah Cunningham**	Quantitative Modeling of Circadian Rhythms
Poster # 56	**Romik Srivastava**	Retinal Development with IFT122
Poster # 57	**Kaley Desher**	Stresses Induce Alternate Growth Phenotype in *K. lactis* Yeast Cells
Poster # 58	**Patrick Griffin**	Natural Epigenetic Variation of SVP Results in Acceleration of the Floral Transition in *Arabidopsis thaliana*
Poster # 59	**Kitra Cates**	In-Vitro DNA-Protein Interaction Analyses of *Glycine max* Transcription Factors

Poster # 60	**Amy Hodges**	The Role of Kinesins in Meiotic Spindle Development in Zea Mays
Poster # 61	**Alison McWhorter Anderson**	Examination of Localization of *Mycoplasma pneumoniae* in relation to Tethered Mucins MUC1 and MUC4
Poster # 62	**Chetan Hebbale**	An Overexpression Screen to Determine How *Legionella pneumophila* Effector Protein LegC7 Disrupts Class C Tethering Complex Formation
Poster # 63	**Stephanie Duff**	The Effect of Yopt2 and Ssae Proteins in Wasp Development of Aphids
Poster # 64	**Scott Schaffer**	Understanding the Role of *Helicobacter pylori acxABC* in an *Escherichia coli* Model System
Poster # 65	**Selin Odman**	Transcriptional Interference and Regulation of the Hyb Hydrogenase Operon of *Salmonella*
Poster # 66	**Anquilla Deleveaux**	Analysis of the Physiological Role of a Bacterial RNA Repair System in *Salmonella*
Poster # 67	**Justin Kimsey**	A Synthetic Lethal Mutant Screen in *Salmonella* Typhimurium to Identify Genes whose Products Cooperate with RNA Ligase, RtcB, in RNA Repair
Poster # 68	**Leah Brown**	Lignin-Modifying Enzymes in Termite Digestive Tract as Potential Biological Pretreatment Component in Cellulosic Ethanol Production
Poster # 69	**Vedika Rajasekaran**	Validation of CRISPR/Cas9 for Genome Editing of Fktn in C2C12 Mouse Myoblast Cell Lines
Poster # 70	**Noreen Syed**	Assembly of a Dual-Selection Cassette for Gene-Specific Targeting by CRISPR/Cas9 to Recapitulate Dystroglycanopathies
Poster # 71	**Claudia Alvarado**	Structural Studies of Non-Coding RNAs
Poster # 72	**Hanna Nune**	Cloning and Constructing of a Complete RNA Polymerase from *Acinetobacter*
Poster # 73	**Paige Lane**	Drug Discovery and Structural Studies of an Essential Transcriptional Regulator, ACIAD0746
Poster # 74	**Kathryn Moore**	Cloning, Expression and Purification of MexT and AmpR from *Pseudomonas aeruginosa*

Poster # 75	**Peter Liaw**	Design of a 1,5-Substituted Triazolyl-Bridged Peptide to Inhibit EGFR Activation
Poster # 76	**Sterling Tran**	The Src Homology 3 Binding Domain is required for Lysophosphatidic Acid 3 Receptor-Mediated Cellular Viability in Melanoma Cells
Poster # 77	**Ian Dunne**	Use of Pre-Pen Skin Testing as an Antimicrobial Stewardship Initiative in a Not-for-Profit Community Health System
Poster # 78	**Robert Barnes**	Engineering *E. coli* Strains for the Increased Production of Glucosylated Organic Compounds
Poster # 79	**Charles Van Brackle**	Using Model-Based Analysis to Develop a More Robust Measure of Flow-Mediated Dilation
Poster # 80	**Kathryn Youngblood**	Estuarine Flow Rates in Coastal Georgia
Poster # 81	**Bhaskar Lokanathan**	Electronic and Photonic Modeling of GaN/InGaN Multiple Quantum Well Light Emitting Diodes
Poster # 82	**Grace Power**	Controlling Contamination of Algal Grazers Using Nitrogen Sources
Poster # 83	**Emily Wall**	Using Artificial Neural Networks to Predict Solar Radiation in Georgia
Poster # 84	**Thomas McBrearty, Daniel Sanchez, Andrew Angoyar, Carson Aft**	Algorithmic Forecasting through Big Data Analytics
Poster # 85	**Andrew Kane, Samantha Cao**	A New Analysis Strategy for Designs with Complex Aliasing
Poster # 86	**Zack Stokes**	Design and Analysis of Reactive Red Dye 120 Absorption by Nanocellulose Gel
Poster # 87	**Nolan Williamson**	Simultaneous Vibration Isolation and Energy Harvesting
Poster # 88	**Bryan Grommersch**	Carbon Encapsulated and Magnesiothermically Reduced Diatoms as a Lithium-Ion Battery Anode
Poster # 89	**Haley Daniel**	Energy Systems Module
Poster # 90	**Mehreen Sultana**	Capabilities of Detecting Atmospheric Cosmic Ray Induced Muon Showers by the NOvA Far Detector

Poster # 91	**Zachary Chilton**	Automated Stellar Classification
Poster # 92	**James White**	The Relationship between CH, CO, and Dust in MBM 12
Poster # 93	**John Dupuy**	Atomic Hydrogen Sticking on Amorphous Water-Ice
Poster # 94	**Elizabeth McMillan**	The Photodissociation of SH+ in the Interstellar Medium
Poster # 95	**Katherine Zarada**	Time to Extinction in Deteriorating Environments
Poster # 96	**Mary Baxter**	Phylogenetic Investigation of Metal Hyperaccumulation Evolution in Wild Sunflowers
Poster # 97	**Allison Koch**	Clearing Natural Forest Lowers Decomposition Rates and Results in Less Diverse Macrofauna and Mesofauna Communities
Poster # 98	**Stuart Sims**	Will Butterfly Gardens Take Off? Butterfly Dynamics and Recruitment in Response to Planted Gardens
Poster # 99	**Ryan Chitwood**	Assessing the Effects of Different Types of Parental Care on Nestling Survival in a Migratory Songbird
Poster # 100	**Tabitha Phillips**	Analyzing Persistent Organic Pollutants in the Tissue of Stranded *Tursiops truncatus* along the Coast of Georgia, USA: Effects of State of Decomposition and Stranding Location
Poster # 101	**Jack Owen**	Do Non-Native Apple Snails Feed Preferentially on Non-Native Aquatic Plants in Lake Seminole, Georgia?
Poster # 102	**Timothy Montgomery**	*Gracilaria vermiculophylla's* Impacts on Herbivory in Georgia's Coastal Ecosystems
Poster # 103	**Elizabeth Dyer**	Evaluating the Climatic and Hydrologic Triggers for the Onset of Harmful Algal Blooms in Inland Water Bodies
Poster # 104	**Malcolm Barnard**	Utilization of *Spirogyra grevilleana* as a Method of Algal Filtration for Reduction of Limnetic Nutrient and *Escherichia coli* Levels
Poster # 105	**Madison Hamilton**	Multi-Walled Carbon Nanotubes Alter the Acute Toxicity of Diclofenac to *Ceriodaphnia dubia* in Sediment: Water Exposures

Poster # 106	**Meryom Pattillo**	Investigating Invertebrate Utilization of Bryophytes in a Mid-Order Piedmont River
Poster # 107	**Sam Santoso**	Stemflow as a Contributing Source to Early Runoff
Poster # 108	**Selena Roth**	Investigating the Effects of Removing Genes for DHPS Degradation in *Ruegeria pomeroyi* DSS-3
Poster # 109	**Rahul Shah**	Mapping the Genetic Basis of Leaf Physical and Chemical Defenses in Sunflower
Poster # 110	**Amna Jamshad**	The Genetic Basis of Leaf Phenolic Content in Cultivated Sunflowers
Poster # 111	**Erin Clark**	Mapping the Genetic Basis of Floral Traits in Cultivated Sunflowers
Poster # 112	**Mavis Wolf**	Nutrient Relations of a Sexually Dimorphic Plant Species
Poster # 113	**Julian Gendreau**	GATA Transcription Factors Substituting HANABA TARANU in *Arabidopsis* Embryo Development
Poster # 114	**Thomas Gottilla**	Understanding the Mating Systems of the Fungi Causing Gummy Stem Blight of Cucurbits
Poster # 115	**Sungwhan Park**	Tea Polyphenols Inhibit Activity of Pancreatic Lipase
Poster # 116	**Belema Abere**	Effect of Carbohydrate and Organic Acids on Anti-*Salmonella* Activity of Cecal Cultures from Broiler Chickens
Poster # 117	**Maddison Wenzel**	Antioxidant Potential of Anthocyanins in Micronized Tart Cherry Puree
Poster # 118	**Mark Zenoble**	Analysis of Cortex and Pith Size Contribution to Fruit Size in Different Apple Cultivars
Poster # 119	**Courtney Alvis**	Factors Influencing Folate Status in Hispanic Women
Poster # 120	**Meagan Patterson**	Folic Acid Knowledge and Use among Participants of a Community-Based Intervention Study in Pregnant Women
Poster # 121	**Randi Goldstein**	Effect of Feeding Method (Breastfeeding vs. Formula) on Postpartum Weight Retention

Poster # 122	**Mallory Osborne, Kaitlyn Barrow, Selena Soviravong, Kayla Patel, Rosie White, Katelynn Porto, Noopur Luthra**	Investigating Macular Pigment Optical Density in Pregnant Mothers during Prenatal and Postnatal Stages
Poster # 123	**Sarah Dawson**	The Associations between Visceral Fat and Appendicular Bone Geometry in Healthy Prepubertal Boys and Girls
Poster # 124	**Jordan Sylvester**	The Relationships between Dietary Protein Intakes and Cortical Bone in Prepubertal Black and White Boys and Girls
Poster # 125	**Derek Coger**	The Relationship between Insulin Resistance and Distal Radius Cortical Bone Geometry
Poster # 126	**Elizabeth Harris**	Genetic Determination of Serum Growth Differentiation Factor 15 throughout Lifespan
Poster # 127	**Erica Coe**	Csmd1—a Novel Candidate Gene Related to Kidney Disease
Poster # 128	**Sarah Yoo**	Influence of Genetic Background on Anthocyanin-Mediated Antioxidant Mechanisms
Poster # 129	**Laura Eckhardt**	Freggie's Green Machine: The Development of an Entertainment Education Nutrition Intervention for Low-Income Preschool Children
Poster # 130	**Andrew Peake**	Do You Know Why 6 - - 2 Is the Same as 6 + 2?
Poster # 131	**Justin Dooly, Darrian Bailey**	Understanding Elementary Reading Fluency and Reading Comprehension
Poster # 132	**Lisa Savchenko**	MindPlay Virtual Reading Coach
Poster # 133	**Jessy Whitenton**	An Examination of Two Different Instructional Approaches for Teaching Preservice Teachers Common Phoneme-Grapheme Relations
Poster # 134	**Susan Oh**	Efficacy and Effectiveness Study of Instructional Conditions When Using IRIS Modules in Teacher Preparation
Poster # 135	**Jane Whatley**	Identifying Leadership Qualities of Classroom Teachers for the Purpose of Guiding Pre-Service Teachers

Poster # 136	**Allison Fialkowski**	Evaluating Pre-Medical Students' Experience with/Understanding of Autism Spectrum Disorders
Poster # 137	**Charlotte Goldman, Kelsie Flanigan, Tyler Stollman**	Pre-Camp Characteristics Predicting Camp Outcomes for Children with Tourette Syndrome
Poster # 138	**Zoheb Sulaiman**	Investigating Student Satisfaction and Social Ties in a Biology Research Network
Poster # 139	**Ananya Moorthy**	Exploring Evolution in the Classroom: Developing a Hands-On Activity Using *Mimulus guttatus*
Poster # 140	**Alexander Ashkeboussi**	Vector Field Augmentation - Augmented Reality and Learning
Poster # 141	**Stephanie Kors**	Child Neglect, Depressive Symptoms, and Substance Use among Children and Adolescents Reported to Child Protective Services
Poster # 142	**Jessica Giannotti, Elizabeth Tiarsmith**	Parenting Intervention Targeting Emotion Communication: Characteristics of Completers and Non-Completers
Poster # 143	**Rebecca Lanier**	Worried, Concerned, and Untroubled: Patterns of Adolescent Worry
Poster # 144	**Emily Maloney**	The Relationship between Adverse Child Experiences, Family Needs, and Child Outcomes
Poster # 145	**Clayton Cowart**	Factors Associated with HPV Diagnosis and Perceived Risk for Cervical Cancer among Unmarried, Sexually Active College Student Females
Poster # 146	**Stefania Barzeva**	Invalid Test Performance during ADHD Evaluations of College Students
Poster # 147	**Carley Borrelli**	Characterizing the College Diet
Poster # 148	**Jillian Maloney, Cara Smith, Mackin D'Amico**	Perception of Student-Athletes on UGA's Campus
Poster # 149	**Bryant Anthony**	How Quality of Parenting Affects the Emotions and Attitudes about Hooking Up
Poster # 150	**Margaret Sparks**	Anti-Binge Drinking Public Health Campaigns: Their Effectiveness in Targeting Female College Students

Poster # 151	**Emily Edwards**	How Can We Create a Sustainable Campus? An Assessment of Students' Awareness and Attitudes toward Food Waste and Sustainability in On-Campus Dining Halls
Poster # 152	**Mara Steine**	The Effectiveness of Counseling and Psychiatric Services at the University of Georgia: An Empirical Investigation
Poster # 153	**Seyi Amosu**	Perceived Social Consequences of Seeking Psychological Help
Poster # 154	**John Williams**	Physical Activity Effects on Social Physique Anxiety
Poster # 155	**Jayme Astarita**	Effects of Physical Activity and Alcohol Consumption on Metabolic Syndrome
Poster # 156	**Sahar Sabet**	Can People with Low Self-Esteem Directly Self-Enhance?
Poster # 157	**Kelsie Walker**	The Influence of Appeal on Overconsumption
Poster # 158	**Jacob Young**	Seeing Danger?: How Weapon Priming Changes Beliefs that the World is Threatening
Poster # 159	**Eric Kure**	Speed Effects on Angular Displacement of Back during Gait
Poster # 160	**Katherine Hsieh**	Ankle Joint Laxity in Those with Chronic Ankle Instability
Poster # 161	**Caroline Ray**	Effect of Music on People with Developmental Disabilities during Physical Activity
Poster # 162	**Alyssa Ford, Alia Church**	Metabolism and Blood Flow in 4 Regions of the Gastrocnemius
Poster # 163	**Kelly-ann Peters, Joanna Szymonik**	The Impacts of Iron Deficiency Anemia on Mitochondrial Capacity
Poster # 164	**Zoe Yurchuck, Rebecca Baltenberger**	Multiple Muscle Stimulation to Enhance Health
Poster # 165	**Meagan Marshburn**	Impact of Intermittent Glucose Oscillations on Vascular Endothelial Cell Inflammation
Poster # 166	**Mitra Kumareswaran**	Changes in Neural Activation Following Daily Practice of Saccade Tasks

Poster # 167	**Joel Owen**	Vocal Repertoire and Call Structure of Red-and-Green Macaws (*Ara chloropterus*)
Poster # 168	**Thomas Johnston**	Social Dynamics Affect Learning of a Technical Skill in Infant Capuchins
Poster # 169	**Margaret Bergmann, Rhianna Baldree, Kristen Smith**	Nut-Cracking Skill and Efficacy in Wild Capuchin Monkeys
Poster # 170	**Steven Pugh, Mckenzie Benson, Rebecca Gaines, Mary Catherine Kelley**	The Impact of Rest and Game Location on NBA Team Performance
Poster # 171	**Parker Thomas, Rebekah Trotti, Christopher Morgan, Kyle Ledesma**	The Effects of Travel on Team-Based Performance
Poster # 172	**Marie Rapoport**	Convergent and Divergent Validity of the WISDM-68
Poster # 173	**Joshua Lukemire**	Use of a Breath-Hold Paradigm to Remove FMRI Variability due to Vascular Factors in Older Adults
Poster # 174	**Zach Borg, Benjamin Listyg**	Examining Entitlement: How Age and Length of Time in a Position are related to a Sense of Entitlement in CEOs
Poster # 175	**Amber Davidson, Kelsey Hamilton**	The Role of Leader Experience on Employee Turnover
Poster # 176	**Juhi Varshney**	Gender as a Moderator of Work-Family Conflict Coping Strategies
Poster # 177	**Jessica Parks**	UGA Employee-Benefit and Retirement Preparedness
Poster # 178	**Sapna Mistry**	Promoting Products, Cutting Costs: Advertising Industry Strategies and Tactics in the United States, 1973-1976
Poster # 179	**Chelsea Harvey**	*The Motion Picture Story Magazine*: Early Niche Markets, "Fan Communities," and Multi-Platform Transmedia Storytelling in the 20th Century
Poster # 180	**Sophie Frankham-Smith**	Image Effects on Young Women's Perceptions and Engagement in Healthful Behaviors

Poster # 181	**Jasmine Clayton**	Potential Health Risks of Teen Online Behaviors
Poster # 182	**Minh Nguyen**	A #whitewashed Landscape: Internalized Racism, Linguistic Discrimination, and the Policing of Ethnic Identity on Twitter
Poster # 183	**Jose Leandro**	Storytelling for Social Justice: Fostering Activism through Collective Memory Work
Poster # 184	**Alexandra Snipes**	A De-Demonized Future for the Radical Right in France? Media Framing of Marine Le Pen
Poster # 185	**Benjamin Leigh**	The Impact of Foreign Aid on Democracy in Africa
Poster # 186	**Jordan McKissick**	Procedural Polarization: Examining Changes in the Construction of the Roll Call Voting Record, 1877-2012
Poster # 187	**Cameron Niakan**	The Impact of Runoffs: Electoral Reform and Duvergerian Factionalism in Metropolitan Atlanta
Poster # 188	**Mary Elizabeth Nuttall**	The Influence of Structural Factors on Mental Health of Young Women in Post-Conflict Liberia
Poster # 189	**Taylor Jordan**	Structural and Cultural Factors Influencing HIV Testing and Risky Sexual Behaviors in Young Liberian Women
Poster # 190	**Sarah Lane**	Syrian Civil War Victims Receiving Medical Care in Israel: Humanity in a War Torn Region
Poster # 191	**Jacqueline DiStefano**	The Refugee Health Care Process: Israel and Syria
Poster # 192	**Danielle Augustine**	Filipinos' Perceptions of the Immigration Journey to the United States
Poster # 193	**Travis Jones**	Regional Sourcing of Obsidian Artifacts through Chemical Analysis (pXRF): A Case Study in Western Canada

Program: Tuesday, March, 31, 2015

Oral Session V: 9:30-10:45 a.m.
Athena Breakout Rooms A, B, C, D, G, H, I, J

Room A	**Jiacheng Chen**	Paper Art in Expanded Forms
	Lazarus Roth	Reflections on the City: Urban Space and Ideology
	Connor Hamm	Thomas Cole's Architectonic America
Room B	**Carson Aft**	The Impact of Monsoon Severity on Southeast Asian Bond Markets
	Kirstie Hostetter	Measuring Willingness to Pay for Sea Level Rise in Coastal Communities of Georgia
	Blake Mathews	Financial Stress among College Students
	Thomas McBrearty	The Impact of Severe Weather Events on Market Returns
Room C	**Mehreen Sultana**	Capabilities of Detecting Atmospheric Cosmic Ray Induced Muon Showers by the NOvA Far Detector
	Lewis Schendowich	Microwave-Assisted and Benzotriazole-Mediated Synthesis of 1,2,4-Triazole-Based Peptidomimetics
	Logan Morrison	High Dynamic Range Imaging For X-ray Image Acquisition
	Lauren Tolbert	Pretreatment of Cellulose Powder and Nanocellulose Gel Production
Room D	**William Robinson**	Resolving Offensive and Defensive Realism
	Matthew Oldham	Evaluating the United States Counterterrorism Strategy Regarding Violent Extremism
	Thomas Trahan	Fostering Peaceful Nuclear Infrastructure Sharing in Southeast Asia
	Paola Rivera	State-Driven Development Initiatives under Kenya's Vision 2030 and Perceptions by Project-Affected Persons in the Northern Rangelands
Room G	**Babajide Oluwadare**	Analysis of P1 Function in *Mycoplasma pneumoniae* Adherence and Gliding
	Tyler Simmonds	The Complete Genome of *Diachasmimorpha longicaudata* rhabdovirus: A Symbiont of Parasitoid Wasps

	Alexander Hedaya	Superparasitism as a Strategy to Overcome Resistance in an Aphid-Parasitoid Interaction
	Tiffany Jenkinson	Tissue Factor-Altered Mice Show Upregulated Pro-Inflammatory Cytokine Gene Expression in Experimental Cerebral Malaria
Room H	**Allison Fialkowski**	Evaluating Pre-Medical Students' Experience with/Understanding of Autism Spectrum Disorders
	Zoheb Sulaiman	Investigating Student Satisfaction and Social Ties in a Biology Research Network
	Mitra Kumareswaran	Addressing the Lack of Access to Public Assistance for Adults with Autism
	Jesse Cann	A Look at the Relevance of Sociology Concepts, Theories, and Methods through the Lens of Health Professionals
Room I	**Amanda Seamon**	Incidence of Anesthesia-Related Fatality in Birds
	Kayla Hargrove	Necessity of Universal Pre-Operative Blood Work in Otherwise Healthy Canines
	Alyssa Wuellner, Kayla Hargrove	Prevalence of Pain in Dogs with Cancer
	Jordyn Whitfield	Quantifying Replicating and Latent CFPHV in Symptomatic and Asymptomatic Infected Turtles
Room J	**Elizabeth Ridgeway**	Nostalgia Inverted: The Golden Age Motif in Strepsiades' Pre-Dramatic History
	Trace Calloway	*The Kalevala* as Tolkien's Inspiration
	Meredith Paker	Theatrical Imagery in Nabokov's *Invitation to a Beheading*

Oral Session VI: 11:00 a.m.-12:15 p.m.
Athena Breakout Rooms A, B, C, D, G

Room A	**Pomi Yun**	The Effects of Preferred Listening on Anxiety, Nausea, and Claustrophobia of Cancer Patients during Radiation Treatment
	Caroline Ray	Effect of Music on People with Developmental Disabilities during Physical Activity

	Taj Shorter	Asymmetric Functional Movement Screen Scores and Injury Occurrence in Collegiate Female Athletes
Room B	**Giselle Fernandez**	Insects in Shakespeare's Works
	Hannah Klevesahl	*Oklahoma!*: The Building of the Dream Ballet in Two Different Mediums
	Jennifer Milley	Practical Grant Writing
Room C	**Laura Pontari**	Closing the Achievement Gap: Elementary Second Language Education in Philadelphia Schools
	Seyi Amosu	Overview of Interdisciplinary Clinics and Community Agencies
	Carver Goodhue	Policy Solutions to Cycles of Poverty and Food Insecurity in Athens, GA
	Bailey Palmer, Mallika Madhusudan	Reducing the Disparity between Federal Sentencing of Crack and Powder Cocaine
Room D	**Joy Maduka**	Type of Infant Feeding, Weight, and Body Composition Changes in Early Infancy
	Mallory Little	Disruption of Signaling at Oocyte MTOCs Leads to Meiotic Division Errors and Embryonic Loss
	Matthew Weber	High-Fat Diet Consumption and Behavioral Dysfunction: What Are the Roles of Maternal vs. Post-Weaning High-Fat Intakes?
	Meredith Paker	The Welfare Effects of Off-Label Prescriptions
Room G	**Charles Bond**	Review of the Potential for Coproducing Bioplastics and Biofuels from the *Spirulina*
	Rachel Usher	Response of Stream Biofilms across an Urbanization Gradient

Oral Session VII: 12:30-1:45 p.m.
Athena Breakout Rooms A, B, C, D

Room A	**Erin Hollander**	Fighting Pain with Pills: Overprescribing and the Opioid Addiction Epidemic
	Amber Davidson	Exploring Resistance to Change through Concern for Diversity

	Davis Parker	Rolling the Dice: The Economic Impact of Casinos
	Anthony Reyna	College Students' Credit Experience and Behavior
Room B	**Kristen Farley**	*Escherichia coli* Uses an IlvA/TrpD-Dependent Mechanism for Thiamine Synthesis
	Leah Brown	Lignin-Modifying Enzymes in Termite Digestive Tract as Potential Biological Pretreatment Component in Cellulosic Ethanol Production
	Fahim Thawer	Role of tRNA Nucleotidyl Transferase and 3' Exonucleases in the Biogenesis of Functional tRNAs in *Escherichia coli*
	Amy Webster	Molecular and Genetic Analysis of the Ab10 Meiotic Drive Haplotype in Maize and Teosinte
Room C	**Morgan Walker**	The Prevalence of Hemoparasites in Seabird Populations on Middleton Island, Alaska
	Alyssa Wuellner	The Severity of Cases Admitted into a Small Animal Hospital and the Phase of the Full Moon
	Emily Vermillion	The Mini-FLOTAC: An Analysis of a Novel Fecal Egg Counting Technique
	Shibo Xu	Effects of Bisphenol A on Macrophages when Controlled with Genistein
Room D	**Sarah Perry**	Differential Consumption of *Eurypanopeus depressus* When Infected by *Loxothylacus panopaei*
	David Stoker	Leaf Litter Quality, Not Local Adaptation of Macroinvertebrate Communities, Drives Leaf Decomposition in Forested Headwater Streams
	Kaleigh Davis	Sponge Colonization across Varying Salinity Regimes

Oral Session VIII: 2:00-3:15 p.m.
Athena Breakout Rooms A, B, C, D, G, H

Room A	**Tifara Brown**	Something to Pass Down: Black Family Stories and the Legacy of Slavery and Jim Crow
	Lucille Reynolds	The Evolution of Quail Hunting Attire in South Georgia and Northern Florida

	Laura Nelson	"Please Excuse Me as I Am in Need:" Bondage and Freedom in Civil War-Era Athens
	Connor Hamm	Towards a Parametric Architecture?
Room B	**Kaitlyn Beck**	The Figure of Constantine the Great in Cynewulf's "Elene"
	Kelsey Lowrey	The Presentation of Victimhood and Virtue in the Holocaust-Focused Works of George Tabori
	Manisha Banga	On Sexuality in Female Ancient Greek Monsters
Room C	**Jason Moraczewski**	Assessment of Proteomic and Glycomic Profiling of Medaka (*Oryzias latipes*) to further the Understanding of the Physiological Response to Low Level Ionizing Radiation
	Erin Hollander	Cas Protein Function in Adaptation of *Streptococcus thermophilus* Type II-A CRISPR-Cas System
	Viral Patel	Expression and Purification of PRMT1 and Mutant Variants
	Justin Dumrongkulraksa	Identification of CRISPR Adaptation Complexes and Associated Nucleic Acids in *Pyrococcus furiosus*
Room D	**Stefania Barzeva**	The Physiological Functioning of Children with Anxiety: A Review of the Literature
	Vanessa Aguilera	Preschoolers' Emotion Knowledge: Relationships to Parental Socialization and Child Behavior Problems
	Megan Kelley	The Effects of Prior Knowledge of Trial Type on Saccade Task Behavior
	Meredith Osborne	The Effects of Lutein and Zeaxanthin on Cognitive Function and Neural Efficiency in Older Adults with and without Cognitive Impairment
Room G	**Holly Boggs**	An Analysis of International Media Coverage of North Korean Nuclear Events
	Margaret Touchton	Truth & Testimony
	Rachel Surminsky	The Evolution of Presidential Unilateral Powers and Congressional Reaction Mechanisms

	Sarah Hedges	Women's Participation in Non-State Militaries Founded on a Secular or Religious Ideology: The Case of Chechnya and Dagestan, Hamas, The PKK
Room H	**Aneek James**	Embedded Bi-Directional FBG Curvature Sensor
	Frederick Hohman	3D Printing the Trefoil Knot and its Pages
	Jackson Hopper	Abundancy and Multiply Perfect Numbers

Oral Session IX: 3:30-4:45 p.m.
Athena Breakout Rooms A, B, C, D, G, H, I, J

Room A	**Kristin Henry**	Something Old, Something New? A Postfeminist Analysis of the Myth of the "Big Day"
	Aashka Dave	Participatory Media: Self-Image and Perception in Women
	Molly Dodd	Hollywood's Risqué Years: Female Body Exposure in Pre-Code Film
Room B	**Caroline Coleman**	Behavioral Testing for Cognitive Deficits in Traumatic Brain Injury Piglets
	Kathryn Sellman	Behavioral Testing on Piglets to Assess Cognitive Deficits of a Traumatic Brain Injury
	Courtney Haviland	Effectiveness in Curing Existing Intramammary Infections and Preventing New Cases in Bred Holstein Heifers
	Onyinyechi Ochiobi	Ryanodine Channel Protein in Insects: A Novel Pesticide Target
Room C	**Christopher Morgan, Kyle Ledesma, Rebekah Trotti, Parker Thomas**	The Effects of Travel on Team-Based Performance
	Mckenzie Benson, Steven Pugh, Rebecca Gaines, Mary Catherine Kelley	The Impact of Rest and Game Location on NBA Team Performance
	Madison Krieger	The Potential Protective Effects of Anthocyanins on Liver Insulin Signaling

	Shubam Sharma	Body Mass Index and Performance-Based Functional Independence in Older Adults
Room D	**Erin Todd**	American Film's Portrayal of CEOs: An Increase in Complex and Confusing Personalities from the 1930s
	Shelby Reilly, Adam Lowe	The Relationship between CEO Risk-Taking Behavior and Employee Attraction and Retention
	Dennis Hardigree, Alex Cole	Correlation between Narcissism and Turnover within the Workplace
Room G	**Catherine Klein**	Inefficiencies of Water Use in Animal Agriculture
	Shreya Ganeshan	Cutting Commercial Energy Costs in Atlanta – One LED Retrofit at a Time
	Mathieu Trunnell	Modeling a Baseline of Forest Energetics: A Method for the Evaluation of Sustainable Practices and Technologies
	Jonah Driggers	Cutting Carbon in the Empire State of the South: A Policy Proposition for Putting Georgia ahead of the Curve
Room H	**Tyler Daugherty**	Spintronics in π-Conjugated Semiconductors: Investigating MEHPPV OLED Magneto-Property Temperature Dependence
	John Stroud	Properties of the Monkey Saddle
	Timur Cetindag	Asteroseismological Age Dating Utilizing a Bayesian Monte-Carlo Search
	Michael Biddle	Continuing Investigation of Electronically Excited States in Indole: Transitioning from Gaseous to Condensed Phase Studies
Room I	**Megan Cannon**	Neural Correlates of Schizotypal Traits in Healthy Participants with High and Low Cognitive Control
	Megan Murphy	Neural White Matter Alterations in Schizophrenia
	Nathan Farr	The Effects of Ethinylestradiol and Levonorgestrel on the Central Nervous System and Behavior in Rats
	Kharine Jean	The Predictive Power of Self-Reported Computer Usage on Processing Speed and Reasoning Scores

Room J	**Yimeng Shi**	An Investigation of Anaerobic Methane Oxidation by Consortia of Methanotrophic Archaea and Bacterial Partners Using Process-Based Modeling
	Malcolm Barnard	Utilization of *Spirogyra grevilleana* as a Method of Algal Filtration for Reduction of Limnetic Nutrient and *Escherichia coli* Levels
	Jack Owen	Using Environmental DNA to Detect and Track Dispersal of the Island Apple Snail Invasion in Lake Seminole, Georgia
	Rachel Ehlinger	Technique of Soil Fractionation for AMS Radiocarbon Analyses

Effect of Carbohydrate and Organic Acids on Anti-*Salmonella* Activity of Cecal Cultures from Broiler Chickens

Belema Abere, CURO Research Assistant
Dr. Mark Harrison, Food Science & Technology, College of Agricultural & Environmental Sciences

This project will examine the ability of undefined cecal cultures from broiler chickens to metabolize glucose to produce substances that inhibit growth of the foodborne pathogen, *Salmonella* Typhimurium. Ceca will be collected from a local commercial poultry processing facility. Cecal cultures will be prepared by inoculating bacterial media with cecal contents and incubating the inoculated media. Test media will be prepared by supplementing a basal medium with various concentrations of glucose. Supplemented test media will be inoculated with 1) cecal culture 2) a nalidixic acid resistant strain of *Salmonella* Typhimurium, or 3) cecal culture and nalidixic acid resistant strain of *Salmonella* Typhimurium. Inoculated media will be incubated for 14 days and media will be sampled in 7 day intervals to enumerate total cecal bacteria and *Salmonella* Typhimurium. Findings from the study will provide information on substrates that can be used by cultures of probiotic bacteria to inhibit colonization of intestinal tract of poultry by *Salmonella* Typhimurium.

The Impact of Monsoon Severity on Southeast Asian Bond Markets

Carson Aft, CURO Research Assistant
Dr. Jeff Netter, Banking & Finance, Terry College of Business

Considering how essential the issuance of bonds can be to the functionality of governments, it is important to understand the deep relationship that they have with the exogenous. Beyond market conditions, clearly many things can have deep impacts. As markets become more quantified and global, it is possible to observe and isolate these external effects. It is from this, that the most natural question arises: How much difference does the weather make? It is obviously too ambitious to aim the microscope at the entire world, but specificity lends itself to clearer results. The more specific question becomes: Does monsoon severity impact local bond markets? This is the question to answer. The significance is that it helps form an understanding of how financial markets, a very abstract construction, interact with something as concrete as the weather. A better understanding leads to more accurate valuation of international bonds, which is important on both national and international scales. It is also appropriate to test whether different timescales impact how strongly the weather changes the markets. For the analysis of daily data, a GARCH model is implemented, looking at daily returns as the best quantifier of bond markets. As for monthly data, the better analysis takes place by observing realized volatility of bonds as a function of both weather deviations as well as recent market volatility. Preliminary data analysis as well as the literature review point in the direction of weather having a significant impact on bond markets in many Southeast Asian countries.

Subcellular Localization of a Regulator of Transferrin Endocytosis in *Trypanosoma brucei*

Bryan Aguanta
Dr. Kojo Mensa-Wilmot, Cellular Biology, Franklin College of Arts & Sciences

Human African Trypanosomiasis (HAT), also known as sleeping sickness, is a neglected disease endemic to rural communities in Sub-Saharan Africa, and is caused by the protozoan parasite *Trypanosoma brucei*. Because all current treatment methods for HAT are difficult to administer and carry a high risk of adverse reactions in patients, there is a need for the characterization of cellular signaling pathways within the parasite, as this may

highlight new targets for drug discovery efforts. *T. brucei* proliferates in the bloodstream of a mammalian host and takes up host transferrin as an essential source of iron via endocytosis. Preliminary findings suggest that the enzyme glycogen synthase kinase-3, beta isoform (GSK3β), is an essential regulator of transferrin endocytosis in *T. brucei*. However, its localization within the cell has yet to be defined. We hypothesize that GSK3β localizes to organelles in the trypanosome endocytic pathway, such as the endocytic vesicles and endosomes. To evaluate this hypothesis, we will use endogenous protein tagging constructs, followed by immunofluorescence assays, which will allow us to visualize the distribution of GSK3β in relation to proteins in known cellular structures. We will also use protein tags to identify other proteins with which GSK3β may interact. In doing this, my goal is to aid future drug discovery endeavors by defining the localization and protein interaction network of an important signal transduction component in the trypanosome.

Preschoolers' Emotion Knowledge: Relationships to Parental Socialization and Child Behavior Problems

Vanessa Aguilera
Dr. Anne Shaffer, Psychology, Franklin College of Arts & Sciences

Understanding causes of emotions is a crucial part of social development (Seidenfeld et al., 2014). Supportive parental responses to children's emotions predict better child emotional understanding (Denham et al., 1994). Poor emotion understanding, in turn, is associated with increased internalizing problems and emotion regulation difficulties in school-aged children (Fine et al., 2003; Hudson & Jacques, 2014). However, research has yet to evaluate relations of child emotion knowledge to parental emotion socialization and child emotional/behavioral problems among preschoolers. We hypothesize that supportive emotion parenting is positively correlated with emotion understanding, and in turn, that accurate emotion understanding is negatively associated with child emotional/behavioral problems. The sample includes 110 mother-child dyads with children ages 3-5. Emotional knowledge was measured via a puppet task (Denham, 1990), scoring accurate and inaccurate identified causes of various emotions. Mothers reported child internalizing and externalizing behaviors (CBCL; Achenbach & Rescorla, 2000) and their own emotion socialization practices (CCNES; Fabes et al., 1990). Preliminary analyses indicate that supportive parental responses to children's emotions were associated with increased accuracy in identifying causes of fearful (r=.23, p=.04) and angry (r=.25, p=.03) emotions. Greater child internalizing problems were associated with higher *inaccurate* causes of happy emotions (r=.24, p=.04) and lower *accurate* causes of sad emotions (r=-.27, p=.02). No significant relations were found between child externalizing problems and emotion knowledge. These findings suggest that emotion knowledge is salient for internalizing, but not externalizing, child problems. Further analyses will compare groups based on child enrollment in formal preschool and other socio-demographic variables.

Effect of Tumor Necrosis Factor on Placental Malaria in B6 and TNF Receptor Knockout Mice

Zil Ali
Dr. Julie Moore, Infectious Diseases, College of Veterinary Medicine

Malaria is a deadly infectious disease that kills over one million people per year, especially pregnant women and children. Placental malaria has been linked with poor pregnancy outcomes such as low birth weight, stillbirth, and abortion. Unfortunately, there is insufficient knowledge about malaria-associated unsuccessful pregnancies. We believe that a key player necessary for

understanding this is tumor necrosis factor (TNF), a pro-inflammatory cytokine. TNF stimulates cells through two surface receptors, TNFR1 and TNFR2. The effects of TNF through these receptors are cell death and cell survival, respectively. We hypothesize that mice lacking TNFR1 will be more likely to overcome a poor pregnancy compared to TNFR2 knockout and B6 (CF7BL/6) mice. TNFR2 knockout mice are expected to have more unsuccessful pregnancies. Each strain of mice will be divided into infected pregnant, infected not-pregnant and uninfected pregnant mice. The mice will be injected intravenously with 1000 *Plasmodium chabaudi* AS-infected red blood cells. The weight and anemia will be assessed at baseline (day 0). On different gestation days (day 9-12), the mice will be sacrificed and the uteroplacental unit and liver will be removed. Half of the organs will be flash frozen in liquid nitrogen and half will be fixed in formalin to be processed for histology. RNA and proteins will be isolated from tissues and markers of apoptosis, necroptosis, and autophagy will be assessed by PCR and western blot. This study is ongoing but we expect it to reveal insight into our understanding of the molecular mechanisms of malaria-associated poor pregnancy outcomes.

Structural Studies of Non-Coding RNAs

Claudia Alvarado, CURO Research Assistant
Dr. Cory Momany, Pharmaceutical & Biomedical Sciences, College of Pharmacy
Dr. Liming Cai, Computer Science, Franklin College of Arts & Sciences
Dr. Russell Malmberg, Plant Biology, Franklin College of Arts & Sciences

RNA plays a central role in many biological processes. RNA can be genetic information, catalyze reactions as ribozymes, or regulate expression of macromolecules. The number of non-coding RNAs (ncRNA) is currently unknown, and only a few ncRNA 3-D structures have been obtained. Our research goal is to optimize experimental methods so that we can produce ncRNAs in large scale, crystalize them, and determine their structures. Initial studies will focus on *E.coli* sRNA families, specifically: Spot-42, GcvB, and RyhB. Methods that will be evaluated include the use of *in vivo* expression of RNA molecules engineered inside tRNA anticodon loops, co-transcription of up- and down-stream ribozymes, the use of crystallization chaperones, and the use of *E. coli* strains with reduced RNAase activities. Assembly of the production systems requires that appropriate DNA segments encoding the RNA molecules be introduced into T7 promoters/terminators and ribozymes be created using PCR amplification. The pET28 vector has been modified to introduce BspQI sites for rapid, single step cloning of sRNA. *In vivo* expression calls for T7 components and the sRNA encoding DNA to be duplicated (up to 50 copies) in tandem into a vector. sRNA interactions with Hfq, an RNA binding protein, will be studied through construction of a vector to allow for over expression and purification of Hfq. The sequences encoding GcvB have been PCR amplified. Structures obtained from crystallography will be compared to those predicted by bioinformatics approaches.

Factors Influencing Folate Status in Hispanic Women

Courtney Alvis, CURO Research Assistant, CURO Graduation Distinction
Dr. Dorothy Hausman, Foods & Nutrition, College of Family & Consumer Sciences

Folate, a water-soluble B vitamin, is essential during pregnancy to support maternal physiological changes as well as fetal growth, organ differentiation, and cell division. There is an inverse relationship between low folate status in the periconceptual period and the likelihood of having a baby with neural tube defects (NTDs). To reduce this risk, folic acid fortification of flour has been mandatory in

the US since 1998. It is recommended women capable of becoming pregnant consume 400 μg of folic acid daily from supplements, fortified foods, or both while also consuming food folate from a varied diet. Despite these measures, Hispanic women have a lower folate status and increased risk for NTD affected pregnancies when compared to African American and Non-Hispanic White women. The primary goal of my research project is the characterization of potential nutrition-related factors that have a detrimental effect on folate status in Hispanic women of child bearing age based on published reports of dietary intake and blood folate levels. In addition, I will also be analyzing preliminary diet recall data from Hispanic, African American, and Non-Hispanic White women of child bearing age from an ongoing study being conducted by my research group. I anticipate the Hispanic women will consume fewer folic acid fortified foods and have a lower total folate intake as compared to the other race/ethnic groups. This would mean that further support is needed to improve the folate status of Hispanic women such as fortification of corn masa flour, a staple in most of their diets.

Overview of Interdisciplinary Clinics and Community Agencies

Seyi Amosu
Dr. J. Maria Bermudez, Child & Family Development, College of Family & Consumer Sciences

Interdisciplinary clinics are a form of community agency that aims to provide clients with services in several related fields in one convenient location. Although several theories exist highlighting the benefits of interdisciplinary work for clients and providers, not much research has been produced in the subject area. The goal of this study is to review the nature of interdisciplinary clinics and to specifically examine client characteristics from the interdisciplinary clinic at the University of Georgia. A random sample of closed case files from the ASPIRE Clinic, located at the University of Georgia, was used to collect demographic information about the client population. The demographic variables included age, gender, race/ethnicity, relationship status, number of children, highest level of education, employment status, annual income, and session fee. Results revealed that the predominant client profile was Anglo women with some college education, varied relationship statuses, and mostly employed full-time. Results of this study add to the growing body of literature about interdisciplinary clinics and who is utilizing such clinics. Suggestions for future research are offered, as well as suggestions for outreach strategies for increasing the utilization of interdisciplinary clinic services by diverse populations.

Perceived Social Consequences of Seeking Psychological Help

Seyi Amosu
Dr. Nathan Carter, Psychology, Franklin College of Arts & Sciences

The purpose of this study is to better understand attitudes towards seeking professional psychological help by examining the influence of perceived social consequences of seeking psychological help. A set of scales was developed to measure perceived social consequences (PSC) of seeking psychological help in regard to: a) friends; b) family; and c) acquaintances. We hypothesized that individuals with a high level of perceived negative consequences from their social groups would have negative beliefs about mental illnesses as well as a high level of stigma about seeking help personally. This in turn was expected to lead to low willingness to seek help as well as low intentions to seek counseling. Results from this study provide evidence that an individual's perceived social consequences related to acquaintances have

the most impact on his/her intentions to seek out and attend therapy, in the sample of college students. Suggestions for future research are offered, as well as recommendations for outreach aimed at combating the effects of social consequences on therapy attendance on college campuses.

How Quality of Parenting Affects the Emotions and Attitudes about Hooking Up

Bryant Anthony, CURO Graduation Distinction
Dr. Leslie Gordon Simons, Sociology, Franklin College of Arts & Sciences

Hooking up is a popular phenomenon on many American college campuses. College students are aware of the phenomenon and some undergraduate students actively engage in various activities that coincide with hooking up while others choose not to participate in the hook-up culture. Past research has found that hooking up is associated with an increased use of alcohol and other drugs as well as an increased risk of experiencing sexual coercion. Both of these behavioral outcomes are associated with risky sex. Few studies, however, have examined the emotional feelings and consequences of hooking up. This paper will focus on the association between hooking up and the positive and negative emotions after hooking up. Furthermore, this study will seek to find whether these feelings vary by gender or if family and individual factors, specifically quality of parenting and attachment style, alter a person's risky sexual behavior. It is reasonable to project that students who have a secure-based attachment will be less likely to hook up in adult romantic relationships in college than students who have an insecure-based attachment. It is also reasonable to project that of those college students who do hook up will report more positive feelings if they are male or have a secure-based attachment. The results collected in this study were collected through a sample of 965 students attending the University of Georgia in the fall of 2013.

Vector Field Augmentation - Augmented Reality and Learning

Alexander Ashkeboussi, CURO Research Assistant
Dr. Kyle Johnsen, College of Engineering

Science and engineering education involves the teaching of abstract concepts of physical sciences. Courses such as 'Fluid Mechanics' rely on traditional deductive teaching methods that often result in students being unable to recall or understand these unintuitive ideas. The emergence of augmented reality and the ubiquity of high performing mobile platforms allows the development of guided, interactive learning applications. The purpose of this research is to first develop an interactive vector-field augmented system that allows 'Fluid Mechanics' students to learn principles of hydrostatics. Then, the relative understanding of the lessons by students using this inductive learning system compared to a control group will illustrate the value of augmented reality as a tool in physical sciences course education.

Effects of Physical Activity and Alcohol Consumption on Metabolic Syndrome

Jayme Astarita, CURO Research Assistant
Dr. Ellen Evans, Kinesiology, College of Education

The transition to college marks a period when many unhealthy behaviors can be developed in young adults. Unfortunately, only 22 % of college students accumulate the recommended amount of physical activity (PA). Low levels of physical activity in these emerging adults may influence health outcomes later in life. In addition to too little involvement in PA, 18-24 year olds have the highest rates of alcohol use among US adults. Metabolic Syndrome (MetS) is a clustering of

cardiovascular disease risk factors (hypertension, dyslipidemia, elevated waist circumference, impaired fasting glucose) that may be influenced by alcohol-related behaviors and PA. The prevalence of MetS for the adult population is estimated to be about 20 to 25% and continues to rise. Due to the high prevalence of alcohol consumption and reported low levels of PA in college students, the primary aims of this study are to examine the independent and interactive associations of alcohol and PA on MetS risk. Study participants (aged 18-24 yrs.) were enrolled at the University of Georgia. PA was measured objectively using the NL-1000 accelerometer (minimum 4 days, >10 hours/day). Blood markers (glucose, triglycerides, HDL) were measured using standard clinical practice following a 12-hour fast. Alcohol consumption was measured as the number of standard drinks containing alcohol consumed in the past 7 days. It is anticipated that greater alcohol consumption will be associated with an unfavorable MetS risk profile, and PA will be inversely associated with MetS risk.

Filipinos' Perceptions of the Immigration Journey to the United States

Danielle Augustine, CURO Research Assistant
Dr. Denise Clark Lewis, Child & Family Development, College of Family & Consumer Sciences

This poster addresses the influence of migration on transnational Filipino family relations. It highlights decisions influencing migration and migration experiences, perceptions, challenges, and struggles of Filipino immigrants. Data were collected through semi-structured, in-depth interviews in both Tagalog and English languages with nine Filipino immigrants. One member of the research team is fluent in both languages; all interviews conducted in Tagalog were translated into English. Data analysis was completed using ATLAS.ti 7 Qualitative Data Analysis software. Two members of the research team performed independent analyses, met to reach consensus on codes, and co-developed a codebook. Using ecological systems and life course theoretical lenses, researchers identified four major themes regarding Filipino immigrants' reasons for migrating to the United States: (1) career opportunities, (2) educational opportunities, (3) political unrest, and (4) family cohesion. Stress, exhaustion, and legal issues (e.g., obtaining visas and traveling with children), were common challenges associated with the migration process. Participants experienced culture shock and adjustment difficulties related to unrealistic expectations of life in the United States. Some of these included differences in language pronunciation, environment, weather, and securing employment. Perceptions of American lifestyle, separation from family, and mastering life skills increased stress. Regrets associated with immigration were separation from Philippine-based family and not instilling Filipino customs in children. Participants reported that having realistic expectations of the United States and open mindedness helped make the adjustment process easier. Most participants reported satisfaction with the migration journey and a positive outlook for their families' futures in the United States.

Locating a Suppressor Gene for the LF4 Protein

Anoosh Bahraini, CURO Research Assistant
Dr. Jacek Gaertig, Cellular Biology, Franklin College of Arts & Sciences

Cilia are cell projections that contain microtubules, and mediate important sensory and motile functions. The Long Flagella Protein 4 (LF4), a MAP kinase, serves as a regulator for the length of the cilia (making cilia shorter). When this gene is overexpressed in the ciliate *Tetrahymena*, the cilia shortens to

the degree where the cell can no longer swim. The phosphorylation target of LF4 is unknown and therefore the mechanism of cilia length regulation by LF4 is not understood. The goal of our experiments is to identify a suppressor gene that allows cilia to assemble despite the overproduction of LF4. We optimized a simple method that selects rare motile cells among the large non-motile population of *Tetrahymena* based on the ability of swimming cells to overcome gravity. We attempted to isolate dominant suppressors by mutagenizing a strain of *Tetrahymena*, crossing it to an LF4-overproducing strain and selecting for heterozygous progeny, but this approach did not produce the desired suppressors. Currently, we are screening for homozygous suppressors by mutagenizing an LF4-overproducing strain and producing its progeny using a self-fertilizing cross known as UniParental Cytogamy (UPC).

On Sexuality in Female Ancient Greek Monsters

Manisha Banga
Dr. Benjamin Wolkow, Classics, Franklin College of Arts & Sciences

This paper employs a literary and feminist approach in an examination of the intersections between sexuality and monstrosity in female ancient Greek monsters. The uniqueness of the female monster lies in the presence of sexuality—insofar as sexuality is synonymous with desirability—in her narrative. This results in the construction of either hypersexuality or desexualization, resulting in an unattainable or undesirable female monster. The researcher argues that the destruction of normative female sexuality, wherein female sexuality is inherently submissive, is a prevalent theme in the construction of female monsters. The first case explores hypersexual monsters and studies the Sirens along with the triad of the Empousa, Lamia, and Mormo. These sexual monsters are dangerous and unattainable because their aggressive actions attract men and ultimately result in male deaths. The second case explores desexualized monsters and studies Medousa, Scylla, and the Amazons. These three mythological entities have their feminine sexuality destroyed in various ways, resulting in desexualized and undesirable monsters. In all cases, the monsters' sexuality is unnatural and ultimately dangerous to men. By subverting the inherently submissive female sexuality, these monsters threaten patriarchal civilization and thus acquire monstrosity. This paper seeks to understand these relationships between femininity, sexuality, and monstrosity.

Utilization of *Spirogyra grevilleana* as a Method of Algal Filtration for Reduction of Limnetic Nutrient and *Escherichia coli* Levels

Malcolm Barnard, Ramsey Scholar
Dr. James Porter, Odum School of Ecology

The freshwater alga *Spirogyra grevilleana* can be used in an algal filtration system to reduce levels of *Escherichia coli,* nitrates and phosphates. Multiple samples of m3 of water were collected from a 2.32 ha lake in North Metro Atlanta, Georgia, USA and maintained under constant laboratory conditions with sixteen hours of continuous lighting on a daily basis. This water was run at a rate of m3 hr-1 continuously through the filtration devices under laboratory conditions with two concentrations of *S. grevilleana*. Samples from both trials were tested over time for *E. coli*, nitrate, phosphate, dissolved oxygen, and pH levels. At either the high or low concentration, the algal filtration devices utilizing *S. grevilleana* reduced *E. coli* by 100% with negligible deviations. In the first trial, the *S. grevilleana* significantly reduced nitrate concentrations by 30% and phosphate concentrations by 23% while maintaining dissolved oxygen and pH levels. Utilizing *S. grevilleana* in an algal filtration device could potentially provide a sustainable, flexible, and low-cost method of

E. coli reduction in freshwater lakes worldwide. Initial results indicate that the use of *S. grevilleana* in conjunction with an algal filtration device is potentially capable of creating potable water.

Engineering *E. coli* Strains for the Increased Production of Glucosylated Organic Compounds

Robert Barnes, CURO Research Assistant
Tian Xia, Graduate Student
Dr. Mark Eiteman, College of Engineering

Glucosylation alters the functionality and bio-availability of many complex and interesting organic compounds such as flavonoids. Specific glucosides are often expensive and difficult to obtain in large quantities. Glycosyltransferases mediate the transfer of glucose from the donor molecule UDP-glucose to the acceptor organic molecule. We have an interest in the design of effective processes to produce these glycosylated compounds, and have studied such processes using two model conversions: quercetin to quercetin-3-glucoside by the glycosyltransferase UGT73B3 and indole-3-acetic acid to 1-O-indole-3-acetyl glucose ester (IAGE) by the glycosyltransferase UGT84B1. *E. coli* strains transformed with these glycosyltransferases and grown under optimal conditions accumulate over 1 g/L of these glycosylated derivatives.

Invalid Test Performance during ADHD Evaluations of College Students

Stefania Barzeva, CURO Research Assistant, CURO Graduation Distinction
Dr. Jason Nelson, Psychology, Franklin College of Arts & Sciences

An increasing number of students with Attention-Deficit Hyperactivity Disorder (ADHD) are entering college. Between 2000 and 2008, rates of postsecondary enrollment for students with ADHD nearly tripled. This increase may be partially attributed to malingering (i.e. fabricating psychological symptoms) for secondary benefits (e.g. extended testing time), as indicated by the high rates of poor symptom validity during ADHD assessments of college-aged individuals. The purpose of the current study was to establish the estimated rate of invalid performance during ADHD assessment based on embedded symptom validity test (SVT) failure and to examine the differences between valid- and invalid-performing individuals. Test scores were collected from the archives of 362 students who had undergone a comprehensive psychological evaluation to determine eligibility for academic accommodations. Participants were included if they were administered embedded SVTs within the Integrated Visual and Auditory Continuous Performance Test, Wechsler Adult Intelligence Scale, and Conner's Adult ADHD Rating Scale. Invalid performance was defined as scoring below the established cutoff of at least one SVT. Twenty-three percent of individuals demonstrated invalid performance on at least one SVT. Individuals who performed below the cutoff of at least one SVT endorsed more ADHD symptoms and demonstrated lower cognitive ability and academic achievement compared to individuals who did not perform below any cutoffs. The significance of this study lies in its contribution to the literature that examines postsecondary ADHD assessment regarding the identification and rates of malingering, diagnostic validity, unfair secondary gains in academia, stimulant medication abuse, and the fair distribution of resources.

The Physiological Functioning of Children with Anxiety: A Review of the Literature

Stefania Barzeva, CURO Research Assistant, CURO Graduation Distinction
Dr. Cynthia Suveg, Psychology, Franklin College of Arts & Sciences

Abstracts

Anxiety disorders are the most prevalent category of psychiatric disorders, with over half of diagnosed individuals reporting onset during childhood. Anxiety disorders affect cognitive, behavioral, and physiological functioning of children. Although research has progressed immensely in understanding childhood anxiety, research examining the physiology of children with anxiety disorders has only recently commenced. Studies consistently estimate that the majority of children diagnosed with anxiety disorders endorse at least one physical symptom. Many of the symptoms of anxiety have important physiological origins that could be measured objectively, and perhaps more accurately than self-reports, with standardized physiological assessments such as heart rate and respiratory sinus arrhythmia (RSA). Heart rate and RSA can be used as indicators of parasympathetic nervous system activity which functions in decreasing emotional reactivity. Children with anxiety disorders often have difficulties decreasing physiological expressions of emotional reactivity, but more research is needed to establish the underlying mechanisms. A review of the current literature is necessary to advance our knowledge in this domain through summarizing our current understanding and noting the gaps in knowledge of the physiology of children with anxiety. The purpose of this review was to (1) summarize the extant literature on the relations of physiological functioning, such as heart rate and RSA, of children with anxiety, (2) to analyze the results of these studies in the broader context of developmental psychopathology, and (3) to acknowledge limitations and propose future directions in the application of physiological assessments in the treatment of childhood anxiety.

Phylogenetic Investigation of Metal Hyperaccumulation Evolution in Wild Sunflowers

Mary Baxter, CURO Research Assistant

Dr. Anne Marie Zimeri, Environmental Health Science, College of Public Health

Plants that have the ability to accumulate extremely high concentrations of metals in their foliage are considered hyperaccumulators. The evolution of plant hyperaccumulation has become of increased interest due to its application towards using plants to clean up environmental contaminants (phytoremediation) or extract valuable metals from soil (phytomining). There are varying hypotheses as to the adaptive benefits of hyperaccumulation. The elemental defense hypothesis, which suggests that high leaf metal concentrations help deter herbivores and inhibit microbial growth, has the most empirical support. We examine the elemental defense hypothesis using a generalist herbivore *Vanessa carduii* (Painted Lady butterfly larvae), and 14 wild sunflower species (*Helianthus*). Species of *Helianthus* were grown under high concentrations of nickel and cadmium, harvested, and then fed to *V. carduii* under nonchoice and choice conditions. *V. carduii* larvae assigned to non-choice experiments were fed either a metal-grown or a control leaf, while larvae assigned to choice experiments were given a choice between a metal-grown and a control leaf of the same species. The percentage of each leaf eaten was measured, and other leaves of each plant were used to measure concentrations of nickel and cadmium along with other putative leaf defense traits such as leaf mass per area, leaf water content, and trichome density. The evolutionary history of nickel and cadmium hyperaccumulation in *Helianthus* was explored using ancestral state reconstruction, and the relationship between herbivory deterrence and leaf metal concentration was assessed. This study constitutes the first ever phylogenetically explicit assessment of the elemental defense hypothesis.

Abstracts

Progression of Lithium Ion Batteries
Samuel Baxter
Dr. Tina Salguero, Chemistry, Franklin College of Arts & Sciences

Lithium Ion batteries have come a long way since their original development. Over the years materials scientists of all kinds have implemented new cathode and anode materials that can increase the performance and cost effectiveness of these batteries. As far as cathode materials go, one that has attracted much attention from researchers is Lithium Cobalt phosphate. The material itself has many beneficial characteristics including High thermal stability, High capacity/potential, inexpensiveness, and it is chemically stable in the electrolyte solutions of a battery. Within the battery, the lithium ions that migrate throughout the electrolyte solution have to travel through the LiCOPO4 material in order to intercalate into the anode material at the other side of the battery. In order to optimize this migration of Lithium ions, we are creating a path of least resistance for them to travel. This path of least resistance involves taking an exfoliated nanosheet morphology of the material and implementing it in the battery instead of its bulk counterpart. There are many steps in this process, but the worthwhile result of a nanosheet battery make the struggle worth pursuing.

The Figure of Constantine the Great in Cynewulf's "Elene"
Kaitlyn Beck, CURO Summer Fellow
Dr. Jonathan Evans, English, Franklin College of Arts & Sciences

The goal of this research project was to examine the Old English poem entitled "Elene," which is Old English for Helena, the mother of Constantine the Great. The primary focus of the project was Constantine the Great, one of the most important political and religious figures in history. I looked at how successful the propaganda of Constantine, particularly his personal connection to Sol Invictus and Jesus Christ, was through how it continued in the poem. To help answer that question, I also tried to determine who the main character of the poem was, and what was Constantine's role within the text. Most of my research involved dealing with primary texts. I looked at "Elene" in Old English and Eusebius' *Life of Constantine*. I also examined scholarly material related to the study. Through my research, I found that while Constantine was certainly elevated to a saint-like status, he was not the true focus of the poem. While Cynewulf is undoubtably influenced by Eusebius' propaganda, it seems that he uses it for his own purposes in highlighting the True Cross in his poem "Elene."

Investigating Regulation of Germline Stem Cell Division Frequency in *Drosophila melanogaster*
Chederli Belongilot, CURO Research Assistant
Dr. Cordula Schulz, Cellular Biology, Franklin College of Arts & Sciences

Stem cells are undifferentiated cells that have the potential to become various cell types. Elucidating the pathways that regulate stem cell division may provide insight into novel therapeutics in repairing or replacing damaged tissue, aging, and cancer. Specifically, the regulation of division frequency in germline stem cells is not well characterized. Using *Drosophila melanogaster* as a model organism, we are investigating the pathway that is responsible for the increase in division frequency in response to mating that is shown in *Drosophila*. To do this, mating experiments are performed using organisms with a specific RNA interference construct in their genome. When the RNAi is active, it can block the translation of a selected candidate protein involved in the pathway. The flies then either go through three rounds of mating with

Drosophila virgins, or remain unmated. Controls that do not have activated RNAi also go through this process. After mating, the testes are dissected, fixed, and then stained with antibodies that label different cells in the testes. Fasciclin III labels the hub, Vasa labels germline stem cells, and Phospho-histone 3 labels the nuclei of dividing cells. Once they are stained, the testes tips are imaged, so the fraction of dividing stem cells can be calculated from each experimental group. If an activated RNAi group shows no increase in stem cell division frequency when mated, the protein coded by the RNA targeted by the RNAi is a likely part of the pathway controlling germline stem cell division frequency in *Drosophila*.

The Forgotten Radical: Southern Women and the New Left Student Protests of the 1960s

Brett Bennett, CURO Summer Fellow
Dr. Brian Drake, History, Franklin College of Arts & Sciences

The narratives of the 1960s student protests revolve around the major campuses of Berkeley, Columbia and other Northern and West Coast universities and much emphasis is placed on the male-dominated roles of speaking and writing. However, were women and southern universities such as the University of Georgia also involved in radicalism and the New Left movement? While ignored in most histories of the decade, student left protests reached the Deep South as well. Students at the University of Georgia staged sit-ins, marches, and formed radical groups. Yet, even within these so-called 'radical' groups, women struggled to be allowed the same opportunities to speak and organize as their male peers. If the Southern radical is overlooked in historical narrative, the female radical is nearly forgotten, as she had to fight for her voice to be heard within even the New Left movement itself. The narrative that leaves out women and the South fails to show the widespread effect and impact of the student left. Using old issues of the *Red and Black* and the papers of major UGA administration members I found the story of radicalism at UGA, focusing particularly on how women involved in sixties radicalism set the stage for the women's liberation movement, arguably one of the biggest successes of the New Left.

The Impact of Rest and Game Location on NBA Team Performance

Mckenzie Benson, Steven Pugh, Rebecca Gaines, Mary Catherine Kelley
Dr. Karl Kuhnert, Psychology, Franklin College of Arts & Sciences

In today's globalized society, travel has become an accepted element of work. However, travel is associated with factors that have the potential to affect performance. Previous research shows a negative relationship between traveling and performance. It has been found that people perform better in familiar environments. Rest has the capacity to counteract the negative effects of traveling. Sports data have been used to analyze these relationships due to the availability of information. For example, the game's home versus away status can be used to measure an unfamiliar environment, point differentials can measure performance, and days rest can objectively measure time between games. For this study, we examined home versus away status and the amount of rest between games using NBA data. We expected that teams playing at an away location would attain less sleep, and therefore away games would amplify the negative impact of lack of rest on performance. Results show that teams performing at away games, who received less rest, performed worse. Teams lost more frequently at away locations than at home. Results support the original prediction of a negative relationship between away game location and performance. Results found from this study can be applied to the

work environment by suggesting that managers give employees adequate rest time while traveling. Traveling employees given ample rest time could offset some of the negative effects of travel. Therefore, business managers should allow for recovery time upon arrival at their business trip destination or run the risk of increased exhaustion and decreased performance.

Nut-Cracking Skill and Efficacy in Wild Capuchin Monkeys

Margaret Bergmann, Rhianna Baldree, Kristen Smith
Dr. Dorothy Fragaszy, Psychology, Franklin College of Arts & Sciences

Skill is defined as fluid and effective performance of a specific action, or set of actions, under varying circumstances. Wild bearded capuchin monkeys typically crack tough palm nuts by placing them on a log or stone anvil, and striking them with stone hammers that weigh a considerable portion of a monkey's body mass. To evaluate nut cracking skill we videotaped twelve habituated male and female adult and adolescent monkeys using an unfamiliar stone hammer of an average weight and size. We documented the monkeys' behavior with the stone during nut-cracking in slow- motion playback. We coded three exploratory actions with the stone (preparatory lifts, spins, and flips), the position of the monkey's hands on the stone each time it moved the stone, the angle of the strike, and outcome (stone dropped; nut cracked). We determined the frequency of actions and outcomes for the first 20 strikes of each individual and report these data for six monkeys. The monkeys cracked 0 to 3 nuts in 20 strikes and produced between 0.6 and 2.35 exploratory actions per strike. The three kinds of actions occurred in approximately equal proportions. Monkeys rarely struck the nut at a slant but four monkeys dropped the stone 1 to 7 times. Exploratory actions may help the monkeys position the stone for an effective strike but in our sample the frequency of these actions did not predict efficiency. Supported by UGA, National Geographic Society, and the PRIMARCH project (European Research Council).

Acute Intra-vmPFC Injections of Galanin Reduce Expression of Conditioned Contextual Threat in Rats

Dionnet Bhatti, CURO Research Assistant, CURO Graduation Distinction
Dr. Philip Holmes, Psychology, Franklin College of Arts & Sciences

Rationale. Previous work has implicated galanin in the modulation of anxiety-like behaviors, yet its potential for facilitating the extinction of aversive memories has not yet been investigated. *Objective.* We evaluated the role of galanin in the medial prefrontal cortex (mPFC) on the expression and extinction of conditioned threat by measuring freezing behavior in a contextual threat-learning paradigm. We asked: Does galanin reduce the expression of the conditioned threat response and does it enhance the acquisition of the learned extinction? *Methods.* Sprague-Dawley rats were conditioned to an aversive context on day one. 20 minutes before the extinction trial on day two, the rats received bilateral microinjections of galanin (0.6 nmol/side) or vehicle (aCSF) into the ventromedial prefrontal cortex (vmPFC). On the third day, the rats were placed into the context once again to further assess the retention of the extinction. *Results.* Bilateral intra-vmPFC injections of galanin reduced freezing, evident in the first few minutes of the extinction session immediately following the intracranial injections. No differences in freezing were evident during the drug-free extinction session occurring on the third day. *Conclusion.* Our results suggest that galanin suppresses the expression of contextual threat-induced defensive behavior without affecting the retention of the extinction learning or

disrupting the initial acquisition of the learned threat association.

Continuing Investigation of Electronically Excited States in Indole: Transitioning from Gaseous to Condensed Phase Studies

Michael Biddle, CURO Summer Fellow
Dr. Susanne Ullrich, Physics & Astronomy, Franklin College of Arts & Sciences

Skin cancer is the most widespread form of cancer in the United States, and is possibly initiated by ultraviolet (UV) radiation damaging DNA contained in skin cells. Certain constituents within our skin, like the polymer eumelanin, naturally protect our bodies from DNA photodamage. However, the mechanism responsible for this UV-shielding is not yet fully understood. Studying the relaxation dynamics of the eumelanin chromophore indole is an important step in explicating the UV photo-protective properties of the eumelanin polymer itself. Multiple techniques, utilizing various excitation wavelengths, were used to study relaxation dynamics of indole in the gas phase. These techniques include time resolved photoelectron spectroscopy, time resolved kinetic energy release, and time resolved ion yield. The 1La and 1Lb states (both possessing $1\pi\pi^*$ character) and the $1\pi\sigma^*$ relaxation pathway were shown to be involved in relaxation at excitation wavelengths ranging from 201 nm – 273 nm, the involvement of the latter ceasing at wavelengths greater than ~263 nm. As eumelanin in the body is in the condensed phase, the next logical step is to replicate a more biologically relevant environment by investigating indole dynamics in various solvents. These solvents will be of differing polarities – such as cyclohexane, ethanol, and water – in order to determine the effects on relaxation dynamics. Time resolved transient absorption spectroscopy (TR-TAS) will be employed to investigate the temporal evolution of neutral electronically excited states and the appearance of solvated electrons (in polar solvents).

The Role of Chondroitin Sulfate Glycosaminoglycans in Glioma Cell Progression

Nicole Bisel, CURO Research Assistant
Dr. Lohitash Karumbaiah, Animal & Dairy Science, College of Agricultural & Environmental Sciences

Glioblastoma multiforme is an aggressive, devastating type of brain tumor characterized by a highly invasive nature. Chondroitin sulfate proteoglycans (CSPGs) and their associated glycosaminoglycan (GAG) side chains have often been implicated in promoting tumor invasiveness. However, conclusive evidence to suggest that CSPGs or their associated CS-GAGs induce brain tumor invasion is currently lacking. We aim to provide evidence that suggests that tumor cell proliferation, migration, and invasion can be affected by the level of sulfation of CS-GAGs in the tumor extracellular matrix. Our goal is to demonstrate that the sulfation of the CS-GAG chains (and not the core protein itself) directly effects tumor cell progression. This will be tested *in vitro* by encapsulating the invasive glioma cell line U87MG-EGFP into differently sulfated CS-GAG hydrogels. We hypothesize that hydrogels containing the oversulfated GAG CS:E will inhibit general tumor growth while hydrogels containing monosulfated GAGs (CS:A and CS:C) will enhance tumor cell progression. Here we will establish a baseline for brain tumor growth in a neutral environment by encapsulating the U87MG-EGFP cells in 1% agarose gels. The nature of cell progression in these control hydrogels will act as a reference point from which we will compare tumor growth in the differently sulfated CS-GAG hydrogels. If glioma malignancy is indeed correlated with the level of sulfation of CS-GAGs, this work could contribute to our knowledge of treatments for brain cancer and potentially

lead to better patient prognoses in clinical medicine.

An Analysis of International Media Coverage of North Korean Nuclear Events

Holly Boggs, CURO Research Assistant
Dr. Brock Tessman, International Affairs, School of Public & International Affairs

Recently, Shin Dong-hyuk, a North Korean defector, admitted to falsifying key aspects of his testimony before the United Nations. That prior testimony was crucial in generating support for a UN Security Council Resolution that proposed sanctions against North Korea for human rights abuses. Shin's testimony, and his falsifications, highlight the role that subjective interpretations play in global politics: states and international organizations frequently make major policy decisions based on interpretations of reality that have been filtered through the lens of individuals and – even more importantly – global media coverage. The first part of this research project analyzed international media coverage of events related to North Korean nuclear weapons and missile tests between 2009 and 2013. Newspaper editorials addressing four North Korean nuclear tests and rocket launches were collected, and then a method of content analysis was used to assess editorial coverage between newspapers and countries according to frequency and ratio of positive-to-negative tone. This project expands upon prior research by exploring three new propositions: that China's media coverage of specific events will be more consistent in tone than that in other countries; frequency of coverage in 2012 will be, on average, lower than in other years because of domestic leadership transitions in South Korea, Japan, and the United States; for South Korea and Japan, geographic proximity to North Korea increases perceived vulnerability and will lead to more frequent, negative editorial coverage of the North's nuclear and missile tests. Findings offer insight about the extent of global media subjectivity in international relations.

Review of the Potential for Coproducing Bioplastics and Biofuels from the *Spirulina*

Charles Bond, CURO Summer Fellow
Dr. Sudhagar Mani, College of Engineering

The potential for coproducing bioplastics and biofuels from algae is known, but the question of what technological processes are necessary has yet to be answered. This research lays the groundwork for such an answer by reviewing the possible technologies and techniques that could be used in such a commercial-scale coproduction system based on the algae *Spirulina*. Alternative systems were roughly designed and compared, with an emphasis on reducing costs to be competitive with petroleum-based fuels and plastics. Varied methods of cultivation, biomass drying, lipid and/or protein extraction, and fuel conversion are considered. Through examining these options, this research makes recommendations for future research, such as experimentation with supercritical fluid extraction of lipids from dried algae for conversion into biodiesel via transesterfication, and the conversion of subsequent residual protein-rich biomass into bioplastics via mixing and molding with glycerol. Through this research, the case is made that a system that produces both renewable fuels and biodegradable plastics is possible, but that the costs must be comprehensively assessed before it is known whether it can compete economically with conventional petroleum products.

Examining Entitlement: How Age and Length of Time in a Position are related to a Sense of Entitlement in CEOs

Zach Borg, Benjamin Listyg
Dr. Brian Hoffman, Psychology, Franklin College of Arts & Sciences

Recent literature indicates that narcissism ratings have been rising over time (Westerman et al., 2011). Higher narcissism rates are a potential cause of concern for organizations, as employee entitlement, a subset of narcissism, is related to counterproductive work behaviors (Fisk, 2010). Yet again, little research examines how leader tenure and age, for example, is related to narcissism. It makes sense that how long a leader has worked at a company could be related to how narcissistic the leader is. However, despite its potential negative organizational impacts, little research examines the relationship between leader tenure and narcissism. To examine this relationship, surveys were administered to CEOs from firms of varying size within a Western European country (n = 156). Our entitlement items came from the Narcissistic Personality Inventory (Raskin & Terry, 1998). Age was self-reported by each CEO, and CEO tenure within their organization was also self-reported. Partial correlations controlling for firm size were run to examine the relationship between CEO age and entitlement. Our results show that younger CEOs tend to score higher on entitlement (r = -.22, p = .01) and that the less time CEOs had been with their organization, the higher their levels of entitlement were (r = -.20, p = .02). These findings suggest that in order to prevent this rise in entitlement amongst younger leaders within organizations, on-boarding programs should be developed to appropriately train new young managers for when they take on more senior positions.

Examining Communication Patterns and Trait Self-Control Using the Actor-Partner Interaction Model

Jerica Bornstein, CURO Summer Fellow, CURO Graduation Distinction
Dr. Michelle vanDellen, Psychology, Franklin College of Arts & Sciences

High self-control is associated with positive relationship outcomes but less is known about how self-control is related to processes that facilitate relationships outcomes. We conducted a study to examine how self-control is related to communication patterns between romantic partners. In this study, 38 couples (76 participants) reported on personal qualities such as mental health, self-control, and personality characteristics. They additionally reported on relationship processes, including communication patterns. Results revealed main effects of actor and partner self-control on mutually constructive communication and demand/withdraw. Additionally, actor and partner self-control interacted to predict mutual avoidant communication patterns. One reason people with high self-control may have better relationships is because they communicate better within those relationships.

Characterizing the College Diet

Carley Borrelli, CURO Research Assistant
Dr. Jim Stringham, Psychology, Franklin College of Arts & Sciences

Little is known about the composition of the college student diet. Diet is often measured using the Food Frequency Questionnaire (FFQ) or self-reporting of daily food consumption. Prior studies have noted that these methods are often skewed and time-consuming. This study aimed to simplify characterization of the college diet by reporting food group percentages. To characterize regular food consumption, we administered a questionnaire that assessed food intake in six groups: fruits, vegetables, protein, dairy, grains, and junk food. Participants were asked to assign percentage estimates of volumetric consumption to each group, with the sum of all groups adding up to 100. Forty college students, aged 18-23, completed the questionnaire. Analysis of results showed that junk food was significantly inversely related to vegetable consumption (r = -0.408, p = 0.009) and grain consumption (r = -0.342, p = 0.031)

respectively. Consumption of grains was also significantly inversely related to fruit consumption ($r = -0.312$, $p = 0.050$). Mean food group values were: 12.05% for fruit consumption, 16.975% for vegetable consumption, 27.975% for grain consumption, 9.85% for dairy consumption, 24.3% for protein consumption, and 8.9% for junk food consumption. These findings characterize the food group percentiles for the college diet and suggest that, in terms of energy consumption, substitution may take place between junk food, vegetables, and grains. Further research is necessary to draw concrete conclusions about these relationships.

Lignin-Modifying Enzymes in Termite Digestive Tract as Potential Biological Pretreatment Component in Cellulosic Ethanol Production

Leah Brown, CURO Research Assistant, CURO Graduation Distinction
Dr. Joy Doran-Peterson, Microbiology, Franklin College of Arts & Sciences

Cellulosic ethanol provides an environmentally advantageous alternative energy source, and is produced by fermentation of sugars from cellulose (and hemicellulose) harbored in the cell walls of relatively untapped biomass resources (e.g., switchgrass and pine). A primary economic obstacle is the biomass pretreatment to overcome the barrier of lignin, a phenolic heteropolymer contributing to the structure of plant cell walls. Current pretreatments require harsh physical and chemical conditions to degrade lignin and release the fermentable carbohydrates. However, a biological pretreatment may exist within the digestive tract of termites, who can extract most of the available sugar in its exclusively lignocellulosic diet. To investigate the mechanism of lignin modification in termites, a transcriptomic differential expression analysis was employed. Termites were fed either filter paper (cellulose) or pine wood (lignocellulose) for seven days to establish distinct expression profiles based on diet. Termite foregut and midgut segments (where lignin modification has been demonstrated to occur) were extracted. RNA was isolated, sequenced, and assembled into a *de novo* reference transcriptome, from which differentially expressed genes were analyzed to identify putative lignin-modifying motifs. Each differentially expressed transcript was automatically annotated against a protein database and manually annotated to confirm automatic annotation results. Two promising transcripts up-regulated in the wood-fed termites were found, and their respective genes were synthesized and placed on an expression vector. Protein products will be purified and assayed for substrate specific activity on model lignin compounds to assess their potential as supplementary components in pretreatment of lignocellulose for the production of ethanol.

Something to Pass Down: Black Family Stories and the Legacy of Slavery and Jim Crow

Tifara Brown
Dr. Barbara McCaskill, English, Franklin College of Arts & Sciences

This project began with a photograph posted on a Facebook page connecting my Louisiana-born relatives, entitled "The Descendants of Coffee and Ella Webb." The image contains these two of my maternal ancestors: Edward "Coffee" Webb (1882-1944), the alleged white son of a Rapides Parish slave owner, and his alleged wife Ella (1885-1954), an enslaved woman. However, Coffee's archival record (such as his death certificate and his World War I registration card) contradicts this story by indicating that Coffee was African American. Discrepancies aside, the Webbs take pride in these maternal ancestors, alongside early paternal relatives, even though their family may be rooted in a union

considered socially taboo and racially corrupting. Instead of evaluating whether or not these stories are true, this research examines how and why such stories of survival, loss, and recovery have functioned during slavery and Jim Crow in African American families descended from Southern bondspeople. In order to consider the relationship between such stories and the families who tell them, this research evaluates archival documents, oral histories, and literature about enslavement and segregation. This investigation finds that instead of wealthy heirlooms, such stories pass down values and codes of conduct: resilience, pride, dignity, sacrifice, and community cohesion. Additionally, this research finds merit and legitimacy in these narratives within the communities that continue creating and remaking them despite the fact that scholars have privileged written over oral texts.

Threat from Abroad, Conflict Within: Border Settlement and Civil War Onset
Brent Buck
Dr. Andrew Owsiak, International Affairs, School of Public & International Affairs

Does the removal of a salient external threat effect the likelihood of civil war? I argue that once a state resolves an external threat to its security the probability of civil war temporarily increases through the mechanisms of demilitarization and decentralization. Previous research has argued that the presence of external territorial threat decreases the probability of civil war both during and after the resolution of the threat. This article challenges those findings by using a series of case studies to illustrate: 1) demilitarization and decentralization follow a state's settlement of its borders 2) that the processes of demilitarization and decentralization decrease the state's capacity to repress its people and maintain order, thereby increasing the probability of civil war following a state's resolution of its borders. Thus, this paper builds on the existing body of research on state capacity arguments for civil war onset and seeks to critique the previous findings linking civil war onset with external threat by claiming the probability of civil war increases (rather than decreases) following the resolution of the threat. These findings suggest that states with recently settled borders must be wary, lest their progress toward interstate peace devolve into intrastate war.

The *Kalevala* as Tolkien's Inspiration
Trace Calloway, CURO Honors Scholar
Dr. Jonathan Evans, English, Franklin College of Arts & Sciences

This research examines the roots of J.R.R. Tolkien's *Lord of the Rings* and his published collection of Middle-earth's myths in *The Silmarillion*, specifically by examining the Finnish *Kalevala*, a compendium of traditional Finnish oral myths collected by Elias Lonnrot. By examining Lonnrot's work, Tolkien's letters, and the research of several other authors in *Tolkien and the Invention of Myth* edited by Jane Chance, I uncover previously undiscussed parallels between Lonnrot's *Kalevala* and Tolkien's *Silmarillion*, and I argue that this Finnish work and its language served as a primary inspiration for Tolkien's interest in myth-making.

A Look at the Relevance of Sociology Concepts, Theories, and Methods through the Lens of Health Professionals
Jesse Cann, CURO Research Assistant
Dr. James Coverdill, Sociology, Franklin College of Arts & Sciences

In recent years there has been much debate over how informed physicians should be on concepts from the behavioral and social sciences. This debate has ultimately led to the restructuring of the Medical College Admissions Test to include an entire section that focuses on these theories and ideas. The

aim of my research was to demonstrate just how relevant many of the concepts from Sociology are to the medical field by helping Dr. Coverdill in redesigning an Introductory Sociology (SOCI 1101) course to emphasize material of particular importance and interest to those who aim to enter the health professions. This was accomplished by searching through medical and health-focused social science journals to identify and screen material for incorporation into lectures or as readings of the class. What was discovered is that sociological ideas are widely found throughout the domain of healthcare from the socialization of medical students learning to deal with death to the disparity of healthcare quality and access between different social classes. Framing these ideas with material and illustrations grounded in the health professions allowed for the development of an introductory sociology course that will be especially appealing and useful to those who seek to enter the health professions. In a broader sense, making prospective health professionals aware of the issues they may face in the world of medicine is the first step in finding solutions to these issues.

Neural Correlates of Schizotypal Traits in Healthy Participants with High and Low Cognitive Control

Megan Cannon
Dr. Jennifer McDowell, Psychology, Franklin College of Arts & Sciences

Schizotypal Personality Disorder (SPD) is part of the schizophrenia spectrum, a group of related disorders that differ in severity. Research shows that schizotypal traits occur in some healthy people and are related to symptoms seen in schizophrenia, including difficulties in cognitive control. Previous research reveals brain activation (measured by fMRI) during cognitive control tasks is correlated with schizotypal traits in healthy populations. Previous studies only examined healthy populations as one group. Healthy populations vary on their cognitive control ability. This study examined whether the relationship between schizotypal traits and brain activation is different in people with low versus high cognitive control. For this study, healthy participants were sorted into high or low cognitive control groups based on results of working memory tasks. Each subject completed the Schizotypal Personality Questionnaire (SPQ) and performed antisaccades in the MRI scanner. The antisaccade task is a measure of cognitive control that involves inhibiting a reflexive response to glance toward a target and instead direct a glance in the opposite direction. Results show a significant negative relationship between positive and negative scales of SPQ and activation in the thalamus in the high cognitive control group. There was a significant positive relationship between positive and negative scales of SPQ and activation in the prefrontal cortex and striatum in the low cognitive control group. These results suggest there are possible neural differences along the schizophrenia spectrum, specifically related to those with poorer cognitive functioning. Understanding these differences could provide information on susceptibility to disorders like schizophrenia.

Genetic Interactions between Pigmentation Pathways and Protein Glycosylation

Leah Caplan, CURO Research Assistant
Dr. Michael Tiemeyer, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Glycoprotein glycans regulate cell-cell interactions, but little is understood about the genetic and biochemical pathways that influence cell- and tissue-specific glycosylation. We generated mutations in *Drosophila melanogaster* (*sff* and *ms16*) that alter the expression of neural-specific glycans in the embryo. In the course of analyzing these mutations, we noticed that their phenotypic

penetrance was affected by mutations in the *white* gene, which encodes for an ABC transporter that transports tryptophan and guanine into the cell. Its absence (*w-*) results in white-eyed adults and is accompanied by neurological and behavioral defects, suggesting that *white* functions in metabolic processes other than just pigmentation. The ABC transporter formed by *brown* and *white* transports guanine into the cell while other pigmentation genes, *cinnabar, vermillion,* and *henna*, modify transported substrates for the production of pigment precursors. The genes *cinnabar* and *vermillion* assist in the modification of tryptophan substrates and *henna* of guanine substrates. To comprehensively determine the extent to which pigmentation genes might also influence tissue-specific glycosylation, we screened pigmentation mutants for genetic interactions with *sff* and *ms16* in regards to the expression of neural-specific glycans. All four pigmentation mutants exhibited genetic interactions with the *sff* and *ms16* glycosylation mutants, indicating that multiple components of pigment production pathways also impact glycoprotein glycosylation. We hypothesized that pigmentation precursors transported by ABC transporters contribute to the formation of nucleotide sugars, essential substrates for glycosylation reactions. To test this hypothesis, nucleotide sugar levels in wildtype and mutant embryos will be quantified by high pressure liquid chromatography.

In-Vitro DNA-Protein Interaction Analyses of *Glycine max* Transcription Factors

Kitra Cates
Dr. Robert Schmitz, Genetics, Franklin College of Arts & Sciences

Soybeans (*Glycine max*) serve as an integral world crop used for oil production, livestock and aquaculture feed, and are a major protein source in the human diet. Soybean root nodules, formed from a symbiotic relationship with soil *Rhizobia*, facilitate nitrogen fixation and nutrient exchange between the two organisms. Research concerning regulatory pathways associated with transcription in nodules is necessary to study the influence of *Rhizobia* on the genetic regulatory pathways in legumes. WRKY-35 and NF-YA1, two transcription factors involved in stress response and nodulation in *Glycine max*, were artificially synthesized for Gateway cloning purposes. The synthetic genes were cloned into an entry vector plasmid, *pDONR207*, and transformed into *Escherichia coli*. Sequential cloning into a destination vector, *pixHALO*, added a HALO motif sequence to the gene sequences and placed the genes under an inducible promoter. Next steps in this project are to demonstrate protein: DNA interactions. Cloned genes will be expressed and translated using an established *in vitro* protocol. We plan to use the synthetic hybrid protein to isolate DNA targets of our transcription factor. Purification with an anti-HALO antibody coupled with high throughput sequencing will identify any targets of our transcription factors, providing novel data on the role of these transcription factors in nodule development and function. This study will serve to simultaneously develop a novel *in vitro* DNA-protein interaction protocol, built to parallel the widely-used, but extremely costly, chromatin immunoprecipitation sequencing protocol. This will provide an efficient, scalable production of transcription factors and the potential to manipulate regulatory networks of interest.

Asteroseismological Age Dating Utilizing a Bayesian Monte-Carlo Search

Timur Cetindag, CURO Research Assistant
Dr. Inseok Song, Physics & Astronomy, Franklin College of Arts & Sciences

Estimations of stellar ages have historically been very difficult for all but very young stars, and this has placed constraints on astrophysical modeling of stellar interiors and stellar evolution. Modern techniques can

measure the ages of mature (several billion years [Gyr] old) Sun-like stars with large (50-80%) uncertainties while age-dating precisions for young (<1 Gyr) stars are much better (<10%). The poor stellar age-dating precision has limited further detailed analysis of various stellar astrophysics. Over the past several years, with the extreme sensitivity and high cadence survey by the Kepler Space Telescope, scientists began detecting subtle variations in brightness due to stellar interior oscillations, whose study is called asteroseismology. Because these oscillations probe the stellar interior, analogous to Earth's interior being analyzed by terrestrial seismic waves, asteroseismology can be utilized to study the internal state of a star and greatly increase the age-dating precision down to the ~1% level for even old stars. In our research, we comb through a collection of ~2500 stars that are of interest to the Kepler Asteroseismic Science Operations Center (KASOC) and search for oscillation signatures of young, hot, active stars. Our goal is to (1) detect unambiguous stellar oscillations among young stars, (2) estimate ages of these young (<1 Gyr) oscillating stars, and (3) compare and cross-calibrate age-dating methods for young (<1 Gyr) and old (1-10 Gyr) stars. We approach this issue by utilizing a Bayesian Monte-Carlo simulation to search for an oscillation signal in the frequency power spectrum of each target.

Ultrastructural Change in the Mitochondria of *Euglena gracilis* Grown in Progressively Anaerobic Conditions

Pei-Ying Chang
Kathryn Dye, Graduate Researcher
Dr. Mark Farmer, Biological Sciences, Franklin College of Arts & Sciences

Some eukaryotes can survive in anaerobic conditions by generating ATP via fermentation and chemiosmosis coupling alone. Based on presence of genes in *Euglena gracilis* it is hypothesized that in this single celled protist glucose can be converted into wax esters generating ATP through substrate level phosphorylation. To test this hypothesis, cells of *Euglena gracilis* were grown in progressively anaerobic conditions. The independent variable of light was also added in the second set of experiments to prevent *Euglena gracilis* from producing oxygen through photosynthesis. Following repeated transfers of cells to conditions with progressively less free oxygen, a stable culture of mostly anaerobic *Euglena gracilis* were established. Using a combination of microscopy techniques (both electron microscopy and fluorescence microscopy) the mitochondria of oxygen deprived *Euglena gracilis* cells were examined for changes in structure and/or physiological function.

Pollen Competition

Angel Chen, CURO Research Assistant
Dr. Shu-Mei Chang, Plant Biology, Franklin College of Arts & Sciences

In hermaphroditic plants, fitness is comprised of female and male components. Female fitness is often measured as seed production of a plant, and male fitness can be measured as siring success through pollen grains. Though seed production has been studied extensively, we know less about how pollen success varies among individuals. In *Ipomoea purpurea* (common morning glory), previous studies showed plants that produce larger pollen grains consistently outperform their smaller pollen counterparts (Foltz & Chang, unpublished data). We have two main goals for this study: first, test the hypothesis that faster pollen tube growth rate is the reason underlying the success of larger pollen grains and second, examine whether small pollen grains can be maintained and coexist with larger pollen grains in nature. To test the first hypothesis, we analyzed the effect of pollen size and inbreeding level on pollen tube growth rate in the common morning glory, *Ipomoea purpurea*. We compared two lines

of plants that produce either large or small pollen and are either outcrossed or inbred and found that larger pollen produce pollen tubes that grow significantly faster than those produced by smaller pollen while inbreeding level has no significant effect on growth rate. To address the second goal, we performed a common garden experiment allowing plants to interact naturally with their pollinators and analyzed differences in their reproductive traits and male and female fitness using molecular markers. Using the results from this study, we will discuss how pollen size variation might be maintained in natural populations.

Female Labor Force Participation and Wages: What Has Changed in the Last 30 Years?

Anne Chen, CURO Summer Fellow, CURO Research Assistant
Dr. Christopher Cornwell, Economics, Terry College of Business

Goldin (2014) suggests that "the converging roles of men and women are among the grandest advances in society and in the economy in the last century." Indeed, women have made great strides in educational attainment, labor-market participation and wages over the last hundred years. They now earn almost 60 percent of bachelor's degrees and comprise a majority of the workforce. Understanding these changes is important for both future labor-market and marriage market implications. In this paper, I hope to study whether the factors contributing to the increase in female labor force participation and wages have changed significantly over time. The primary motive to understanding this topic is that women have come to dominate the U.S. college campus. There are many questions that arise given this fact: why male college enrollment has been stagnant, how that translates to the U.S. labor market, and how social norms may change in the future based on changing economic incentives. The project will have three components. First, I will compile a review of the literature on the advancement of women in the labor market, its effects on household formation, and opposing arguments against popular explanations as to which is the main contributor. Second, I will construct my analysis samples using NLSY data I have extracted and organized. Finally, I will construct my empirical models and apply the appropriate econometric methods to assess the relative importance of the factors in explaining gender disparities in wages and age at first marriage across the two cohorts.

Paper Art in Expanded Forms

Jiacheng Chen, CURO Summer Fellow, CURO Research Assistant
Prof. Eileen Wallace, Lamar Dodd School of Art

Traditionally, the art of papermaking was dedicated primarily to the arts of the book and calligraphy. Today, paper has been widely experimented with as a primary material for sculptural works and is considered an independent art as well. The polychotomous nature of paper to have multiple applications from the same basic material makes paper as an art form difficult to categorize. The first issue that I explored was paper formation. Paper formation occurs through the fibrillation of the fibers via beating and then reconstitution of the fibers through sheet formation. To investigate the correlation between the raw materials and procedural differences, I applied two variables to my experiment, cooking times of the raw plant fibers and beating times for the processed fiber. The results showed a distinct correlation between the variables and the resulting variations in paper qualities and characteristics. That information would help an artist with the knowledge to achieve a specific and ideal paper for artwork. It has also been my research interest to explore contemporary oriental aesthetics, particularly

in the idea of "dissolved imagery". Firstly, images are generated through photographic printing (cyanotype), screenprinting or pulp painting on wet paper. When the paper was air dried, natural forces of shrinkage and distortion moved the fibers and therefore the imagery, too. In this way, the imagery's original consistency is dissolved. The artist relinquishes a certain amount of control as the paper dries without restraint. Theoretically, this methodology aligns itself with the "blank-leaving" (*liu-bai*) aesthetics of ancient *shanshui* painting.

S. cerevisiae as a Model System for the Oligomerization and Aggregation of Aβ Peptides using Cup1p as a Reporter

Michael Cheng, CURO Research Assistant
Dr. Walter Schmidt, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Alzheimer's disease (AD) is a progressive neurodegenerative disorder. The accumulation of amyloid beta (Aβ) peptides observed with AD, combined with their toxicity, implicates them as a causative agent of the disease. Aβ peptides, particularly Aβ1-40 and -42, are prone to form oligomers and aggregate into amyloid plaques. It is the oligomer form that is widely accepted as the most cytotoxic form of Aβ. The purpose of this research is to build a useful tool for the expression and evaluation of Aβ peptides in a simple, cost-effective genetic system (*S. cerevisiae*). Because Aβ peptides are nontoxic to yeast and do not produce an easily assessable phenotype, an Aβ-Cup1p fusion will be used as a reporter. Cup1p is a small protein metallothionein that mediates resistance to high concentrations of copper. We predicted that aggregation of the Aβ-Cup1p fusion would result in the inhibition of Cup1p activity, thus increasing sensitivity to copper. Varying levels of sensitivity to copper were observed in yeast strains expressing Aβ1-19, -28, -40 and -42 fused with Cup1p. Using this system, various Aβ formation and degradation mechanisms are being investigated, such as the ability of Insulin Degrading Enzyme (IDE) to cleave Aβ peptides and disaggregate Aβ-Cup1p to restore Cup1p function.

Automated Stellar Classification

Zachary Chilton, CURO Research Assistant
Dr. Inseok Song, Physics & Astronomy, Franklin College of Arts & Sciences

Measuring stellar properties is a very time consuming process. Key properties — such as effective temperature, surface gravity, radial velocity, rotational velocity, and metallicity— are tediously calculated from the many absorption features in a star's approximately-blackbody spectrum. We worked to develop an autonomous method of calculating these properties using theoretical stellar spectra. High resolution theoretical spectra have been calculated for stars with many combinations of physical parameters. After creating a database of theoretical spectra, we implemented various computational methods to find the theoretical spectrum that best matches the input observed spectrum. We then assign the key properties that generated the theoretical spectrum to the observed star. We can identify these stellar parameters in a matter of minutes.

Assessing the Effects of Different Types of Parental Care on Nestling Survival in a Migratory Songbird

Ryan Chitwood
Joanna Hatt, Researcher
Mason Cline, Graduate Student
Dr. Robert Cooper, Warnell School of Forestry & Natural Resources

Nest predation has been shown to limit the productivity of forest-breeding migratory songbirds, with implications for both the conservation and evolution of life history strategies of these species. Skutch's hypothesis (1949) offers that nest predation should

increase with nest activity. Because provisioning of young dominates nest activity during the nestling stage, high provisioning rates should coincide with low nestling survival in spite of the direct benefits of provisioning. Many studies have tested Skutch's hypothesis by comparing predation risk between the incubation and nestling stages with little consensus. Here, we studied the effects of different strategies of parental care on Black-throated Blue Warbler *(Setophaga caerulescens)* nestling survival. We hypothesized that during the nestling stage male provisioning rates should correlate positively with nestling survival, allowing females to provision at lower rates. We measured provisioning rates for each parent in addition to other parental care types. Female provisioning rate was the top predictor of nestling survival for all models followed by male provisioning rate. Covariate predictions showed a relatively strong negative influence of female provisioning rate on survival and the opposite trend for male provisioning rate. Our results suggest that the optimal parental care strategy incorporates a shared provisioning burden that allows both parents to spend more time investing in other activities.

Mapping the Genetic Basis of Floral Traits in Cultivated Sunflowers

Erin Clark, CURO Research Assistant
Dr. Lisa Donovan, Plant Biology, Franklin College of Arts & Sciences

The goal of this study is to quantify the amount of genetic variation in floral architecture in cultivated sunflowers (*Helianthus annuus*), as well as identify the genetic basis of key floral traits. Despite their agricultural and horticultural importance, the genetic bases of most floral traits have yet to be determined in crop sunflowers. Recent efforts have established a 288-line association mapping panel for the purposes of determining the genetic basis of key phenotypic traits. This panel captures about 90% of the genetic variation across varieties of crop sunflowers, and each line has been heavily genotyped for over 5500 SNPs. With the use of this association mapping panel and its known genotype data, floral traits of interest can be mapped to the genome. It is hypothesized that the floral architecture of *Helianthus annuus* is most likely based on many genes of small effect, though there may be individual regions of very large effect present as well. Based on phenotypic variation in floral traits in wild *Helianthus*, it is also hypothesized that variation in floral architecture is independent of overall flower size, and that these traits map to distinct regions.

Introgression of a *Wolbachia* Infection into a Non-Native Host

Kathryn Clark, CURO Research Assistant
Dr. Kelly Dyer, Genetics, Franklin College of Arts & Sciences

Wolbachia are maternally inherited endosymbiotic bacteria that infect upwards of 60% of all insects. Their effect on the insect host varies depending on the strain of *Wolbachia* and the genetic composition of the insect host. In two closely related species of *Drosophila*, the same stain of *Wolbachia* causes different effects. In *D. recens*, the *Wolbachia* infection causes all the offspring to die. In *D. subquinaria*, however, this same *Wolbachia* strain causes only the males to die. The amount of male-killing varies within this species, potentially based on where the line is located geographically. In order to further analyze the effects of *Wolbachia* in non-native hosts and to ask how common the gene that suppresses male killing was, I attempted to move a *Wolbachia* infection into a *D. subquinaria* line that was not resistant to male-killing. This would enable further understanding of the evolutionary history of *Wolbachia* in these species and how the genetics of host and bacteria interact to drive

the evolution of this association. To do this, I established crosses between females from hybrid *D. subquinaria* lines (lines with mitochondrial DNA from *D. recens* and nuclear DNA from *D. subquinaria*) and males of either *D. subquinaria* or *D. transvera*. In each cross, I collected all the offspring and counted the number of males and females, looking to see if a female bias was present in the offspring sex ratio. After many generations of backcrossing, no male-killing was found among the various backgrounds of introgressed lines.

Potential Health Risks of Teen Online Behaviors

Jasmine Clayton, CURO Research Assistant
Dr. Maria Len-Rios, Grady College of Journalism & Mass Communication

With the rapidly changing technological structure of our society, many adolescents are growing up where smart phones and social media are a significant part of their lives. These media provide constant means for their social communication online, whether through direct or indirect interaction. The goal of our research is to explore how these online portals affect the psychological and physical well-being and health of adolescents. To begin our process, we will conduct a literature review. Our search will be guided by Festinger's social comparison theory. According to a previous study (Spurr, Shelley, Berry, Lois & Walker, 2013), teens often compare their bodies with media images, leading to unhealthy actions in an effort to attain an idealized image or persona. In another study (Wang, Jackson, Gaskin & Wang, 2014), there was positive relation between a user's well-being and the use of social networking sites for social communication. For this study, we plan to conduct six focus groups with adolescent boys (2) and girls (4) at middle schools in Henry County in order to learn how adolescents' use of social media impacts their views on body image and level of self-esteem. Then we will transcribe the interviews, engage in data analysis and write up the research results for publication. This research is significant because social media has a growing impact on adolescents. We can use our research to propose ways to combat any negative effects social media has on the health and well-being of adolescents.

Csmd1—a Novel Candidate Gene Related to Kidney Disease

Erica Coe, CURO Research Assistant
Dr. Robert Pazdro, Foods & Nutrition, College of Family & Consumer Sciences

Kidney disease is one of the top ten causes of death in the United States, affecting millions of people each year. The endogenous antioxidant glutathione (GSH) is a key regulator of renal oxidative stress and the ratio of GSH to its oxidized form (GSSG) is an informative indicator of oxidative stress. We quantified GSH concentrations and GSH:GSSG in kidneys isolated from 30 genetically-diverse inbred mouse strains. We performed genome-wide association mapping by efficient mixed model analysis (EMMA). We discovered that phenotypic variation of renal GSH concentrations and GSH:GSSG ratios were associated with 19 single nucleotide polymorphisms (SNPs) located within the Csmd1 gene on chromosome 8. We predict that Csmd1 is a regulator of renal oxidative stress and possibly renal disease. To validate our results, we used statistical analyses and EMMA to evaluate several renal function strain survey data sets in the Mouse Phenome Database (MPD), a community resource that facilitates the sharing of strain data. To experimentally validate Csmd1 and its role in renal oxidative stress and disease, we ordered a litter of Csmd1 knockout mice, which were successfully cryorecovered by the mutant Mouse Regional Resource Centers (MMRRC). In our next study, we will test whether Csmd1 knockout mice exhibit a higher incidence of

renal disease compared to wild-type and heterozygous littermate control mice.

The Relationship between Insulin Resistance and Distal Radius Cortical Bone Geometry

Derek Coger, CURO Research Assistant
Dr. Richard Lewis, Foods & Nutrition, College of Family & Consumer Sciences

Insulin is a pancreatic beta cell-derived hormone responsible for glucose regulation and activation of bone-forming osteoblasts. Insulin resistance has been associated with suboptimal cortical bone density and geometry of adolescent boys and girls, but these relationships have not yet been investigated at the distal radius, a common fracture site in children. The purpose of this cross-sectional analysis was to determine the relationships between insulin resistance and distal radius cortical bone measures in non-Hispanic white early-pubertal girls (breast development stage 2/3; mean age = 11.5 years; N=39) who participated in a zinc supplementation trial. Total body fat mass and fat-free soft tissue (FFST) mass were determined by dual-energy X-ray absorptiometry (Discovery A, Hologic Inc). Radius cortical bone geometry was assessed at the 20% site relative to the distal growth plate via peripheral quantitative computed tomography (Stratec XCT 2000). Fasting serum insulin and glucose concentrations were measured, and the homeostasis model assessment of insulin resistance (HOMA-IR) was calculated. Multiple linear regression controlling for FFST, fat mass, and breast development revealed HOMA-IR as a positive predictor of radial cortical bone area and thickness, but a negative predictor of volumetric bone mineral density. These findings suggest that insulin resistance differentially influences cortical bone size versus density. Bone strength depends on both size and density so future studies should investigate the clinical significance of these differential bone responses to insulin resistance.

Behavioral Testing for Cognitive Deficits in Traumatic Brain Injury Piglets

Caroline Coleman, Foundation Fellow
Dr. Franklin West, Animal & Dairy Science, College of Agricultural & Environmental Sciences

According to the CDC, traumatic brain injuries (TBI) are a contributing factor to over 30% of injury-related deaths in the United States every year, with children aged 0-4 at the highest risk. Currently, there are limited therapy options available for the treatment of TBI and the resulting cognitive and neurobehavioral deficits, but human induced pluripotent stem cell-derived neural stem cells (iNSCs) have recently become an option for injury treatment. Due to similarities in brain structure and early development, we are using a piglet model to 1) develop quantifiable and repeatable behavioral tests, 2) determine cognitive deficits following a TBI and 3) explore the effects of subsequent iNSC treatment on these deficits. Two behavioral tests that we will develop for use in the study are the open-field test and the social recognition test. In the open-field test, piglets will be placed in a 12 x 14 foot arena and observed to determine their exploratory interest, motor behaviors, and normal/abnormal behaviors. We expect that normal piglets will have high exploratory interest and will not exhibit any motor deficits or abnormal behaviors. The social recognition test will measure sociability and the ability to recognize familiar pigs from unfamiliar pigs, or social memory. We expect that normal pigs will be highly social and will be able to distinguish familiar pigs from unfamiliar pigs, demonstrating a high level of social memory. The successful development of these tests will satisfy the first objective of creating a quantifiable and reliable behavioral assessment of cognitive abilities in piglets.

Abstracts

The Politicization of Soccer in Brazil, and the Effect of the 2014 FIFA World Cup on Brazilian Politics

Aaron Conley, CURO Honors Scholar, CURO Summer Fellow
Dr. Barry Hollander, Grady College of Journalism & Mass Communication

The role of soccer has come to play a significant role in the culture of many nations. In Brazil, soccer is more culturally significant than in almost any other state. Soccer has even successfully affected Brazilian politics, especially in regards to the 2014 FIFA World Cup. The tension began in Brazil immediately following its successful bid for the tournament but increased to climax following Brazil's semi-final loss to Germany, the eventual champions. Through analyzing social media, especially Twitter, in Brazil throughout the tournament, the 2014 FIFA World Cup was shown to have a significant impact on the nation's presidential election in October 2014. Prior to the tournament, President Dilma Rousseff possessed a significant lead in the polls, but she only won re-election by approximately 4% of the vote in a runoff. Polling data, as well as sentiment analysis on social media, shows the gap between Rousseff and her main opponent, Aécio Neves, closing over the course of the tournament. Sentiment analysis is a method of analyzing social media that places individual posts on a 0-100 scale from negative to positive, determining the overall sentiment of a specific topic or individual over a specific period of time. This type of analysis was performed on Twitter in Brazil throughout the 2014 FIFA World Cup and showed that soccer could truly have a political effect on one of the fastest growing nations in the world.

Age Related Effects on Brain Activation during Cognitive Control Tasks in Subjects with Schizophrenia

Joseph Coppiano, CURO Research Assistant
Dr. Jennifer McDowell, Psychology, Franklin College of Arts & Sciences

Cognitive Control (CC) is vital to daily functioning. One aspect of CC is the ability to filter out irrelevant information in order to perform task-related responses. Functional magnetic resonance imaging (fMRI) research over CC circuitry has sought to better understand the effects of factors such as age or psychiatric disorders. A model of CC is antisaccade task performance. The task requires subjects to fixate on a central cue and instructs them to redirect their gaze towards the mirror image location (opposite direction, same distance) when it moves to the side. Despite well-documented findings that subjects with schizophrenia (SZ) (a psychiatric disorder) perform poorly on antisaccade tasks (more errors and longer reaction times) and display lower brain activations compared to healthy controls, studies of age effects on antisaccade performance are minimal. Through dividing diagnostic groups, SZ (N=24) and healthy controls with low cognitive control (LCC) (behaviorally comparable to SZ) (N=24), into age groups of younger (n=10) and older (n=14) adults, this study seeks to observe the effects age has upon antisaccade CC circuitry. We hypothesize that group and age will have no effect on behavioral measures, but that imaging measures will show higher activation in LCC than SZ and display negative age effects. As hypothesized, there were no differences in behavioral performance. Analyzing the effects of group and age using a 2x2 ANOVA, it was found that SZ had less activation than younger LCC but similar activation between older diagnostic groups. The results demonstrate that SZ does display brain-circuitry changes with age.

Abstracts

Factors Associated with HPV Diagnosis and Perceived Risk for Cervical Cancer among Unmarried, Sexually Active College Student Females

Clayton Cowart, CURO Research Assistant
Dr. Matthew Lee Smith, Health Promotion & Behavior, College of Public Health

Background: The human papillomavirus (HPV) has been identified as the leading cause of cervical cancer in the United States. While risk factors for contracting HPV have been well studied, less is known about the characteristics of those living with the virus and their perceptions about associated health ramifications. The purposes of this study were to examine factors associated with unmarried college student females': (1) HPV diagnosis and (2) perceived risk of getting cervical cancer in future years. *Methods:* Data were analyzed from 1,106 unmarried, sexually active college student females aged 18 to 26 using an internet-delivered questionnaire. Binary logistic regression was performed to compare HPV-related knowledge, HPV vaccination-related perceptions, HPV vaccination mandate support, healthcare utilization, sexual behaviors, and personal characteristics across participants' HPV status. Multinomial logistic regression was performed to assess the degree to which these factors were associated with participants' perceived risk of getting cervical cancer. *Results:* Relative to those who had not been diagnosed with HPV, participants who had more lifetime sex partners ($P<0.001$), had unprotected sex during last intercourse ($P=0.003$), had a Pap test in the past year ($P<0.001$), and perceived themselves to be at higher risk for cervical cancer ($P<0.001$) were significantly more likely to be diagnosed with HPV. Those with HPV were also significantly more likely to support HPV vaccination mandates for school-aged youth ($P=0.036$) and have fewer friends vaccinated against HPV ($P=0.002$). Participants who were uninsured ($P=0.011$), diagnosed with HPV ($P<0.001$), and had a family member ($P<0.001$) or friend ($P<0.001$) diagnosed with cervical cancer were more likely to perceive themselves to be at risk for developing cervical cancer in future years.

Quantitative Modeling of Circadian Rhythms

Sarah Cunningham, CURO Research Assistant
Dr. Jonathan Arnold, Genetics, Franklin College of Arts & Sciences

Many genes of *Neurospora crassa* are under the control of the biological clock in the cell. The clock consists of a closed network group involving the genes *white collar-1, white collar-2, frequency,* and *clock controlled genes* and their RNA and protein products. A model has been proposed that improves upon published models by differentiating between reactions in the cytoplasm and nucleus of the cell. Computer simulations and ensemble runs were used to test these models and refine them. The model created was found to fit experimental data collected from *Neurospora* better than previously published models. A better model could improve research done on all areas of the clock and further our understanding of circadian rhythms.

Energy Systems Module

Haley Daniel, CURO Research Assistant
Dr. Tim Foutz, College of Engineering

An energy system was analyzed based on the full supply chain from primary energy resource availability to consumer demand in order to develop an energy systems module for use in a freshman-sophomore engineering education setting. Each step in power generation and consumption was studied and analyzed in order to emphasize the importance of understanding the process from an engineering standpoint. Aspects of sustainability at each level were also considered. A flow chart of pertinent data and information in the power sector was compiled

and included transportation, power generation, emissions, transmission, distribution, and consumer demand. It is suggested here that this could supplement coursework in various engineering disciplines. From this analysis, data for each component in the system were compiled and detailed, with one being that the average household energy consumption in the state of Georgia was determined to be 13,176 kWh in 2012. This module can be used as a guideline for understanding the interconnectedness of the energy systems process and can serve as a basis for conceptualizing improvements to an existing system.

Spintronics in π-Conjugated Semiconductors: Investigating MEHPPV OLED Magneto-Property Temperature Dependence

Tyler Daugherty, CURO Research Assistant
Dr. Tho Nguyen, Physics & Astronomy, Franklin College of Arts & Sciences

We present findings from the investigation of the effects on magneto-properties of OLEDs when exposed to high-temperature environments. We fabricate organic light emitting diodes (OLEDs) using an organic polymer mixture of MEHPPV and PDOT and test under high thermal conditions in a cryostat with oscillating magnetic field application. The research is important for the development of OLEDs, specifically for integration into common technology which necessitates functionality at a wide birth of temperatures and fields.

Participatory Media: Self-Image and Perception in Women

Aashka Dave, CURO Research Assistant
Dr. Leara Rhodes, Grady College of Journalism & Mass Communication

Participatory media is a developing concept in today's media landscape. A form of media that combines the typically disparate fields of content creation and content consumption, participatory media is very nearly eponymous. Audience members submit content for publication and consumption by other audience members, making audiences both content creators and content consumers. This research investigates participatory media and how it influences body-image and self-perception in women and girls. The research also discusses audience receptivity to furthered media messaging as a result of image and perception influences. A content analysis examined content from three participatory media platforms: *Rookie Magazine*, *Interrupt Magazine*, and *BuzzFeed*. *Rookie Magazine*, founded in September 2011, has a large following among its audience of teenage girls and is continuing to grow. *Interrupt Magazine* has an audience of women in their twenties, but also caters to the LGBTQ community. *BuzzFeed*, as a more mainstream media platform, rounds out the research, providing an opportunity to examine participatory media on a larger scale. Content from these publications was examined through five different themes: body, personality, perception, image, beauty, and size. Content was labelled according to eleven negatively and positively perceived emotions in conjunction with these themes. This information formed the basis for a discussion on the positivity or negativity of participatory media platforms as they relate to image and perception, and resulting audience receptivity. The research consequently determines that participatory media platforms are a positive source of self-image and perception-based thought processes through the emotions that they induce.

Exploring Resistance to Change through Concern for Diversity

Amber Davidson, CURO Research Assistant, CURO Graduation Distinction
Dr. Karl Kuhnert, Psychology, Franklin College of Arts & Sciences

Resistance to change is a common challenge faced by organizations. There are more changes in the workplace today than ever before, especially as organizations strive to bring in innovation, creativity, and a more heterogeneous workforce, which ultimately creates a more diverse work environment. Resistance to change can be viewed in two ways. First, resistance can be interpreted negatively: as a problem, threat, or an enemy to be done away with through any means necessary. Second, resistance to change can be seen more positively: as a way to communicate or a way to interpret discomfort or hesitancy from employees. Colleges and universities also experience resistance to change as they keep up with changing rules and regulations, and which perspective of resistance they take can impact their success in the future. In order to explore resistance to change, the present study examines the importance of openness to new ideas at a university in the southeastern United States. This study found that employees at the university who were more open to new ideas saw a need for increased diversity. When accounting for length of time spent at the organization, this study further found that newer employees' resistance to change and diversity is not different than that of longer-tenured employees. Interestingly, this implies that longer-tenured employees, who are generally older too, are not more likely to resist attempts to increase diversity practices. Greater attention should be directed at gaining the support of all employees, not just new employees, when introducing new diversity programs.

The Role of Leader Experience on Employee Turnover

Amber Davidson, CURO Research Assistant, CURO Graduation Distinction
Kelsey Hamilton
Dr. Brian Hoffman, Psychology, Franklin College of Arts & Sciences

Recent research suggests that leader experience may be a catalyst for employee turnover (Hamori & Koyncu, 2015; Heavey, Holwerda, & Hausknecht, 2013). Given the importance of retaining top talent in the modern world of work (Ployhart, Weekley, & Baughman, 2006), organizations should examine leadership experience as a potential influence on employee turnover. In the current study, N = 155 CEOs from various Italian companies completed a survey. The average level of work experience for the CEOs was 18.24 years (SD = 9.25), while their followers had an average level of work experience of 11.79 years (SD = 8.80). Financial data came from the company Aida, software version 81.00, on 12/08/2014. Our study explores the impact of CEO work experience on staff turnover rates and turnover costs. Our results show a positive relationship between CEO work experience and staff turnover rates $r = 0.27$, $p = 0.04$. Additionally, the relationship between CEO work experience and turnover costs was positive $r = 0.34$, $p = 0.01$. In other words, the more experience a CEO had, the more frequently employees left their organizations. This indicates that a leader's experience on the job may have a negative impact on employees, and that leadership training may be necessary to help leaders maintain positive relationships with followers (Bond & Naughton, 2011). Leader experience is often seen as vital for a company, but if it negatively impacts employee outcomes, its role in leader selection efforts should be diminished.

Sponge Colonization across Varying Salinity Regimes

Kaleigh Davis
Dr. Jeb Byers, Odum School of Ecology

The boring sponge, *Cliona celata*, occupies oyster shells and other calcareous substrate in marine environments. *C. celata* colonization reduces bivalve shell strength, resulting in increased predation vulnerability and

potentially habitat exclusion. Low salinity has been suggested to limit *C. celata* populations. We tested the effect of mean and variable salinity on *C. celata* colonization and survival, first with an observational study of field patterns. Oysters were collected from reefs with episodic freshwater pulses (high salinity variability) and from reefs with more stable salinity regimes to examine the percent cover of *C. celata*. Next, in a manipulative lab mesocosm trial we collected *C. celata* samples in the field and exposed them to different experimentally controlled salinity regimes. We quantified survival time, both over a stable salinity gradient and over high salinity variability (freshet like). We predict *C. celata* will be less tolerant of consistently low salinity and even less tolerant of freshwater pulses. Determining sponge tolerance to different salinity regimes will improve our ability to predict where *C. celata* will have a significant impact on oyster reefs, informing oyster restoration project design. We hope to extend this research to look for relationships between historical oyster reef locations and changes in *C. celata* range as a result of decreased freshwater input in coastal Georgia.

The Associations between Visceral Fat and Appendicular Bone Geometry in Healthy Prepubertal Boys and Girls

Sarah Dawson, CURO Research Assistant
Dr. Richard Lewis, Foods & Nutrition, College of Family & Consumer Sciences

Visceral adipose tissue (VAT) is considered a pathogenic fat depot implicated in numerous metabolic and musculoskeletal conditions. In adults, VAT has been shown to negatively predict cortical bone area and strength at the midshaft of the femur, whereas these associations in adolescents have not been studied. This project aimed to determine the relationships between VAT and cortical bone parameters from data collected on a group of healthy children, participants from a previously conducted vitamin D trial. Participants were black and white boys and girls in the early stages of puberty (mean age=11.3 years; sexual maturation stage 2/3; N=159). Measures of VAT (g), total body (TB) fat mass (kg), fat-free soft tissue (FFST; kg), bone area (TBBA; cm2), and bone mineral content (TBBMC; g) were determined by dual-energy X-ray absorptiometry (Delphi-A, Hologic Inc). Mid-radius and tibia bone geometry were measured via peripheral quantitative computed tomography at the 66% site from the distal growth plate (Stratec XCT 2000). Partial correlations correcting for maturation, race, sex, and FFST revealed negative associations between VAT and both tibia ($r=-0.194$, $p=.037$) and radius ($r=-0.219$, $p=.018$) cortical volumetric BMD (vBMD). Additionally, VAT was negatively correlated with both TBBA ($r=-0.353$, $p<.001$) and height-adjusted TBBMC ($r=-0.338$, $p<.001$). Since vBMD is an important determinant of cortical bone strength, our results suggest that higher VAT may contribute to the increased risk for skeletal fractures in obese adolescents. Further studies should explore the mechanisms through which VAT affects cortical bone.

The Effects of Dietary Wheat Gluten on Swine and Poultry Growth Performance

Carson De Mille, CURO Research Assistant
Dr. Michael Azain, Animal & Dairy Science, College of Agricultural & Environmental Sciences

Wheat gluten is a high-protein ingredient that is commonly used in pet food and milk replacers, but not commonly in swine or poultry diets. Two studies were conducted to determine the effect of dietary wheat gluten on growth performance in weaned pigs and broiler chicks. The first study utilized 48 pigs that were weaned at approximately 21 days and blocked according to weight and gender (16 pens, 3 pigs/pen). There were 4 dietary treatments: 2 control diets and 2 experimental diets with 5 or 10% wheat gluten added at the

expense of corn and soybean meal. Dietary treatments were randomly assigned to pens. Test diets were fed for 2 weeks post weaning, followed by common diet an additional 2 weeks. The second study used 120 day-old broiler chicks that were randomly allotted to pens (20 pens, 6 birds/pen). Birds were assigned to one of 4 dietary treatments: 2 control diets and 2 experimental diets with 5 or 10% wheat gluten. The birds were weighed and feed intake was measured twice weekly for 2 weeks. In both pig and broiler studies, the animals fed diets with 5% wheat gluten grew significantly faster than the animals on other diets ($P<0.05$). Growth rate of pigs or chicks fed the 10% wheat gluten diets was similar to the control diets. These results suggest that the addition of 5% wheat gluten to swine or poultry diets results in a stimulation of growth. This response may be related to the unique amino acid profile of wheat gluten.

Analysis of the Physiological Role of a Bacterial RNA Repair System in *Salmonella*

Anquilla Deleveaux, CURO Research Assistant, CURO Graduation Distinction
Dr. Anna Karls, Microbiology, Franklin College of Arts & Sciences

Salmonella is a pathogen known to cause food poisoning. A specific strain of *Salmonella* known as *Salmonella enterica* subsp. *enterica* serovar Typhimurium is associated with gastrointestinal disease in humans. The pathogen is responsible for over a million illnesses, tens of thousands of hospitalization cases, and hundreds of deaths every year. In our lab, we are characterizing the components, regulation, and physiological role of an RNA repair system that is part of the RpoN regulon of *Salmonella*. RtcR is the transcriptional regulator of the operon that encodes the primary genes of this repair system. However, the environmental stimulus to activate RtcR is unknown. The RNA repair operon is not transcribed under most laboratory growth conditions, including in minimal or rich media; thus far, only the stress of treatment with Mitomycin C (MMC) has been found to induce expression of the RNA repair operon. MMC is an antibiotic that is known to cause RNA and DNA damage, but the mechanism of how MMC activates RtcR is unclear. Other components of the system include enzymes RtcA, RtcB, Rsr (Ro-sixty related protein) and noncoding Y RNAs, YrlA and YrlB. Although we know the enzymatic function of the components of the RNA repair system, their physiological importance is unknown. Therefore, the overall goal is to learn more about the system and how it functions. We want to know if there is an advantage to having the genes expressed from this operon under stressful conditions by stressing the cells with MMC and measuring viability.

Extracellular Vesicle Dependent Transfer of a Virulence Factor Confers Human Infectivity to *Trypanosoma brucei brucei*

Lauren Dennison, Foundation Fellow
Dr. Stephen Hajduk, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Trypanosoma brucei rhodesiense is the causative agent of human African sleeping sickness. The related subspecies *Trypanosoma brucei brucei* is able to establish infection in cattle, but is highly susceptible to lysis by a subclass of human high-density lipoproteins called trypanosome lytic factor (TLF) and therefore unable to cause human African trypanosomiasis. *T. b. rhodesiense* is resistant to TLF due to the serum resistance-associated (SRA) protein, a virulence factor localized to the parasite endosome that binds and inhibits TLF following endocytosis. Recently, our lab has shown that African trypanosomes produce nanotubes that arise from initial budding of the flagellar membrane and vesicularize into heterologous 100 nm

extracellular vesicles (EVs). Western blot analysis of EVs purified from trypanosomes expressing the virulence factor SRA showed that SRA was a component of EVs. We next investigated if transfer of SRA to non-human infectious *T. b. brucei*, via EVs, contributed to pathogenesis. We confirmed EV mediated SRA transfer to *T. b. brucei* by flow cytometry and showed that direct addition of SRA containing EVs to wild-type *T. b. brucei* cells leads to increased survival upon incubation with TLF. Additionally, co-cultivation of *T. b. brucei* and SRA expressing *T. b. rhodesiense* in a trans-well chamber which blocked direct cell-cell contact but allowed EV diffusion conferred TLF resistance to *T. b. brucei*. Our findings show that cell-cell communication, mediated by EVs, can alter the pathogenicity of African trypanosomes.

Stresses Induce Alternate Growth Phenotype in *K. lactis* Yeast Cells
Kaley Desher, CURO Research Assistant
Dr. Michael McEachern, Genetics, Franklin College of Arts & Sciences

When exposed to stresses, *Kluyveromyces lactis* yeast cells exhibit altered cell growth phenotype. It was shown that cells grown on medium containing 0.5 mM sodium arsenate were converted at 50-90% frequency to either of two growing alternate colony morphologies. These altered forms were able to switch back to the normal faster growing morphology at high frequency, indicating the possibility of an epigenetic switch in the growth behavior of *K. lactis* cells. Various strains of *K. lactis* were exposed to different stresses to evaluate which strains are capable of generating the slow growing phenotype at high frequency as well as whether these colonies are more resistant to stresses. Several *K. lactis* strains were plated on YPD plates as well as starvation, 1.2 M NaCl, and 1.5 M KCl stress plates. Dilutions of colonies from each condition were performed so that the presence of the different colony phenotypes could be quantified for comparison purposes.

The Importance of Personality and Emotion in Women's Support for Georgia's Secession, 1860-1861
Melissa DeVelvis, CURO Graduation Distinction
Dr. Stephen Berry, History, Franklin College of Arts & Sciences

Last semester, I completed my honors thesis titled "From 'great excitement' to 'gloomy and threatening:' White Women's Responses to Georgia's Secession, 1860-1861." Through studying letters, journals, and newspaper articles written and read by upper-class antebellum women, I argued that their opinions regarding secession were heavily influenced by personality and degree of contentment with their antebellum lives. Women who felt restricted by plantation life, for instance, often embraced secession as a sign of change and opportunity. Others, more prone to anxiety and worry, denounced secession and predicted the devastation of war. To best illustrate the importance of emotion and personality in deciding one's opinion on secession, I used the letters of sisters Florence and Georgia King of St. Simon's Island, Georgia. Both were raised wealthy on the same isolated plantation, and both were greatly burdened by their mother's death and their ensuing responsibilities. Florence, always a worrier, immediately sensed that secession would wreak havoc on the South and fretted over the ensuing changes. Her sister Georgia responded in the opposite manner, delighting in the escape from her dull life offered by the exciting debates in Milledgeville. These findings are significant in that they reveal mixed opinions surrounding secession in Georgia, rather than unanimous support. Using primary sources such as letters and journals has granted me greater insight into women's history during the time period, an area less explored. Finally,

a study in Civil War events as they occurred differs from the dominant "Lost Cause" memory discussed by historians.

Executive Function Moderates Relationship between Mobility and Functional Independence in Older Adults

Jonathan Dickens, CURO Research Assistant, CURO Graduation Distinction
Dr. L. Stephen Miller, Psychology, Franklin College of Arts & Sciences

Prior research has shown a positive relationship between executive function (EF) and mobility. Similarly, mobility is positively related to functional independence in older adults. This study examined EF as a moderator of the relationship between mobility and functional independence in 62 cognitively intact older adults (39 female) aged 64 to 99 (M = 72.02, SD = 7.46). Mobility was measured using the Short Physical Performance Battery (SPPB); balance, gait, and chair stand subtests were summed to obtain a total score. EF and functional independence were assessed via the CNS-Vital Signs cognitive battery and the Direct Assessment of Functional Status-Revised (DAFS-R), respectively. Hierarchical moderation analysis was conducted first with EF, SPPB total score, and EF x SPPB as predictors of DAFS-R, and then with each of the SPPB subtests independently. Significant interactions were further investigated via simple slopes analysis at ± 1 SD of EF. Age was controlled in all analyses. EF x SPPB predicted DAFS-R ($F = 5.099$, $p = .028$), and significant subtest interactions included gait x EF ($F = 6.470$, $p = .014$) and chair stand x EF ($F = 4.275$, $p = .043$). Simple slopes analyses indicated that SPPB ($t = 2.13$, $p = .038$) and gait ($t = 2.20$, $p = .031$) predicted DAFS-R only at lower levels of EF. Results confirm that EF and mobility interact to predict functional independence in healthy, older adults. In older adults with poor EF, slower gait and weaker lower extremity strength may indicate greater risk for functional decline.

The Refugee Health Care Process: Israel and Syria

Jacqueline DiStefano, CURO Research Assistant
Dr. Denise Clark Lewis, Child & Family Development, College of Family & Consumer Sciences

Since the civil unrest in Syria began in 2011, over four million Syrians have fled and another 6.5 million have become internally displaced. Despite the long and tense history between Israel and Syria, Israel has been providing healthcare to fleeing and injured Syrian children, civilians, and fighters since early 2013. This form of conflict and distance can cause a dehumanization of enemy nations by creating a negative stereotypical image of the individuals based on the greater geopolitical landscape. My research on this situation focuses on individual human relationships between Israeli healthcare providers and Syrian patients. I want to understand the dynamics of their interactions, specifically, how their relationships were influenced by the healthcare process. Participants were Israeli healthcare providers who came from a variety of different cultural, religious, and social backgrounds as well as different healthcare careers. Qualitative data were carefully analyzed by two researchers through Atlas TI in order to bring out a variety of themes showing if and how their relationships evolved over time and what types of barriers they overcame. Overall, the study is intended to show the experiences of the healthcare providers and their Syrian patients and how these experiences influence bidirectional humanization.

Abstracts

Hollywood's Risqué Years: Female Body Exposure in Pre-Code Film

Molly Dodd, CURO Research Assistant
Dr. Patricia Hunt-Hurst, Textiles, Merchandising & Interiors, College of Family & Consumer Sciences

Hollywood's allure has fascinated Americans since the industry's inception. To some dismay, the silver screen's molding influence surpassed that of traditional centers of influence, such as home, church, and school (Griffith & Mayer, p. 191, 1970). Hollywood's power to directly transmit messages to an impressionable population unsettled many over the fear of Hollywood's ability to perpetuate "immoral behavior." The classification "Pre-Code" describes movies produced prior to the 1934 implementation of Motion Picture Producers and Distributors' Code. The Code banned the portrayal of "immoral behaviors;" however, prior to 1934 "Hollywood made movies for adults who didn't want to be lied to about human nature…[it was] a complex, diverse, socially responsive American cinema" (Viera, p. 6, 1999). In this research, I analyzed female body exposure in fifteen Pre-Code films spanning from 1925 to 1934, including, *Hula* (1925), *Glorifying the American Girl* (1929), and *The Gold Diggers of 1933* (1933). Considered "Hollywood's risqué years," my research provides summary statistics on the portrayal of body exposure in its frequency, function, and degree in comparison with film criticism. My research hypothesizes the influence of female body exposure in Pre-Code film on the progression of female exposure found in socially acceptable fashion and dress. It is considered that "American morals and manners were sped up more by the screen than by any other agency except possibly the automobile" (Griffith & Mayer, p. 198, 1970). Thus, the portrayal of females in Pre-Code films can be considered a catalyzing factor in the social emancipation of women.

Understanding Elementary Reading Fluency and Reading Comprehension

Justin Dooly, CURO Research Assistant
Darrian Bailey
Dr. Paula Schwanenflugel, Educational Psychology, College of Education

The Physical Activity and Learning (PAL) program is a five-year federal grant program designed to study the effects that physical activity has on literacy and reading comprehension. This five day a week program took place at Fowler Drive Elementary School and Chase Street Elementary School in Athens, GA. The method in which this research was conducted was based on grade level. Students participated in one of two groups (2nd and 3rd graders; and 4th and 5th graders) so the students could read grade-level passages and receive grade-level instruction. Research was conducted in order to determine the effects of the PAL program and subsequent exposure to expository texts on students' fluency and comprehension. In the reading fluency enrichment, choral and echo reading strategies were employed in order to determine these practices' effectiveness in the classroom. These strategies were introduced to ensure that these students attained the knowledge for fluency as they progress in the education system. Reading comprehension was a secondary approach to the research. As a result, several strategies were implemented into daily practice. Such procedures included understanding the significance of bolded, highlighted, or otherwise simple queues for important vocabulary; providing experience with questions after reading the material; as well as subjecting students to various forms of questions they may encounter in the future. Ultimately, this research will not only help identify effective practices for improving reading fluency and reading comprehension, but it will also provide an academic jumpstart for those in the program.

Abstracts

Cutting Carbon in the Empire State of the South: A Policy Proposition for Putting Georgia ahead of the Curve

Jonah Driggers, Foundation Fellow
Dr. Jennifer Rice, Geography, Franklin College of Arts & Sciences

Climate change is already having, and will continue to have, profound implications around the world. These impacts include intensification of tropical storms and hurricanes, increased temperatures, rising sea levels, and drought-induced water shortages in both the residential and agricultural sectors. These physical changes will in turn impact social and economic systems. Response to the current and potential impacts of climate change is growing in the US and beyond: the Obama Administration has taken steps to address the role of the US as the largest cumulative emitter of greenhouse gases, thousands of protests have taken place worldwide, and billions of dollars have been divested from fossil-fuel companies. Despite these political and social responses, Georgia remains reluctant to address climate change. By failing to act early on this issue, Georgia is putting both its citizens and its reputation as a national leader at risk. This paper argues that the state should establish itself as a leader in energy innovation and sustainability for both economic and social benefits. To this end, a literature review and subsequent cost-benefit analysis were conducted to evaluate the status quo and three policy alternatives: a revenue-neutral carbon tax in Atlanta; introduction of net-metering technology statewide; and energy labeling and comparison of energy consumption. Based on this evaluation, this paper advocates the implementation of a revenue-neutral carbon tax in Atlanta as the most effective tool to mitigate carbon emissions and place Georgia in a strategic position in the years to come.

The Effect of Yopt2 and *Ssae* Proteins in Wasp Development of Aphids

Stephanie Duff
Dr. Vincent Starai, Microbiology, Franklin College of Arts & Sciences

Some *Acyrthosiphon pisum*, or the pea aphid, contain the endosymbiotic bacteria *Hamiltonella defensa* that is infected with the bacteriophage APSE, which prevents larval development of parasitic wasps such as *Aphidius ervi* from developing within the aphid. The pea aphid is unable to be eliminated by common pesticides, unlike other insects, which increases the chances for crop loss due to its massive population size. My objective is to use yeast as a simple eukaryotic model system and characterize the function of the *SsaE* and *YopT2* effectors from *H. Defensa*. Some include identifying the effects on yeast physiology and membrane trafficking pathways. The procedures include spot plating to test for toxicity and staining with FM4-64 (many of the effects are not known yet but further research progress will result in more findings). The effects will shed light on the mechanisms by which this protein disrupts wasp development. Plasmids with and without the *YopT2* effector protein proved to be nontoxic to the eukaryotic cells. Performing this study to better understand the host-symbiont-pathogen interactions in *A. pisum-H. defensa-A. ervi* system through a yeast model may help to prevent the massive population of pea aphids from killing agriculturally important crops.

Identification of CRISPR Adaptation Complexes and Associated Nucleic Acids in *Pyrococcus furiosus*

Justin Dumrongkulraksa, CURO Honors Scholar, CURO Research Assistant
Dr. Michael Terns, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

CRISPR (Clustered, Regularly Interspaced, Short Palindromic Repeats) loci and their

associated genes (Cas) comprise an adaptive defense system in bacteria and archaea. This immune system protects the organism against phages and other foreign genetic elements. Immunity is conferred via the acquisition and incorporation of invader DNA into the CRISPR locus. The locus is then transcribed to produce an RNA complement (crRNA), which guides Cas nucleases in targeted invader DNA or RNA destruction. In the archaeon *Pyrococcus furiosus*, our lab has recently obtained genetic evidence linking four Cas proteins (Cas 1, Cas 2, and Cas4-1 and 4-2) to the function of integration of new invader sequences in a process called CRISPR adaptation. However, the individual roles of each protein in the process are unknown, and will be an area of exploration in my research. To examine how each of these proteins functions in the cell, a number of experiments will be performed in order to test whether or not each protein is a member of a larger functional complex. Additionally, the ability of each protein to bind, recognize, or capture CRISPR and invader DNA will be tested. A CRISPR locus sequence called the leader is required for adaptation. As Cas 1, Cas 2, Cas 4-1, and Cas 4-2 are believed to have some role in adaptation, the leader along with invader DNA is expected to be found when these proteins are immunoprecipitated. This finding would provide substantial insight into this relatively new system.

Use of Pre-Pen Skin Testing as an Antimicrobial Stewardship Initiative in a Not-for-Profit Community Health System

Ian Dunne
Dr. Lindsey Welch, Division of Experience Programs, College of Pharmacy

Pre-Pen (benzylpenicilloyl polylysine) is a penicillin skin test antigen indicated for the assessment of penicillin hypersensitivity in patients with a history of penicillin allergy. Reported penicillin allergies increase both antibiotic costs and resistance by requiring use of alternatives such as carbapenems, vancomycin, and clindamycin. Pre-Pen offers potential to allow safe use of penicillin or related beta-lactam antibiotics resulting in cost savings while avoiding risks of increasing resistance from unnecessary overuse. The objective of this study is to determine clinical and financial impacts of Pre-Pen implementation in patients with a history of suspected IgE-mediated penicillin allergy. In 2014, Pre-Pen was added to the health-system formulary and restricted for use by infectious disease physicians or the antibiotic stewardship team. A pre-approved protocol for nurse administration of Pre-Pen was developed as well as a process for the team to contact physicians in the event of needed therapy changes based on test results. This retrospective chart review included adult inpatients admitted to the health system who received Pre-Pen between August 2014 and February 2015. Included patients had a suspected or confirmed infection that could be treated with beta-lactam antibiotics. Patients were excluded based on history of anaphylaxis, immunocompromised status, or any condition interfering with interpretation of test results. The primary outcomes of this study include antibiotic therapy before and after Pre-Pen and antibiotic acquisition cost data. Secondary outcomes include skin test results and the number of tests ordered secondary to stewardship team recommendations.

Atomic Hydrogen Sticking on Amorphous Water-Ice

John Dupuy
Dr. Phillip Stancil & Dr. Steven Lewis, Physics & Astronomy, Franklin College of Arts & Sciences

Gas-grain reactions have been invoked to explain the formation of many molecules in the interstellar medium (ISM). Molecular hydrogen is one such molecule. Utilizing

classical molecular dynamics, we are in the process of simulating the sticking and/or scattering process of a hydrogen atom on an amorphous water-ice slab (about 20 angstroms thick). Two temperatures of the slab (10 and 70 K) and a variety of kinetic temperatures (10 - 600 K) for the atom are used to model conditions of the ISM. We will determine the sticking probabilities and coefficients using one hundred simulations at each kinetic temperature of the atom for each temperature of the ice. The goal is to verify our results with previous simulations and experiments so that we can move forward with different molecular species (such as O_2) whose primary formation mechanism is through gas-grain reactions. As of now, we are in the process of determining interaction parameters to be utilized for the H-H_2O potential interaction. Once these parameters are calculated, the simulation will be run and analyzed to verify that these parameters describe the system in a physical way.

Evaluating the Climatic and Hydrologic Triggers for the Onset of Harmful Algal Blooms in Inland Water Bodies

Elizabeth Dyer
Dr. Adam Milewski, Geology, Franklin College of Arts & Sciences

Harmful algal blooms (HABs) are a serious environmental problem. They can form in both saltwater and freshwater and can cause serious health problems for wildlife, humans, and agriculture. The formation of saltwater harmful algal blooms has been studied more than freshwater blooms. Therefore, this study focused on looking at the factors that cause the development of HABs in freshwater, to see if they are similar to the factors that cause their presence in saltwater. It is important to ascertain these factors in order to find ways to avoid, prevent, or manage decreased water quality in public water supply. HABs are usually caused by an excess of nutrients being permitted to settle in one place by the timing of environmental factors; this excess of nutrients allows an algae bloom to grow very quickly. We investigated environmental factors (e.g., temperature and streamflow) in Lake Lanier, GA to evaluate the controls of two important parameters. It was hypothesized that we will find that harmful algal blooms are more likely to develop during warm weather and low streamflow, which allows the nutrients and algae to accumulate. The temperature of the water was gathered from field testing, and streamflow was obtained from the USGS. The presence or absence of harmful algal blooms in the lake was determined from Chlorophyll-A field testing and remote sensing algorithms. The results show a strong correlation between high streamflow during the seven days before sampling and lower Chlorophyll-A values; no correlation was found between water temperature and Chlorophyll-A values.

Freggie's Green Machine: The Development of an Entertainment Education Nutrition Intervention for Low-Income Preschool Children

Laura Eckhardt, CURO Research Assistant
Dr. Caree Cotwright, Foods & Nutrition, College of Family & Consumer Sciences

Childhood obesity is a major issue in America, with more than a third of children being overweight or obese. An ideal location to deliver nutrition education is in early childcare centers due to the amount of time spent in that environment and the development of children's food preferences at an early age. One way to promote healthy behavior is to encourage higher intakes of fruits and vegetables. The purpose of this study is to examine the effectiveness of an entertainment education nutrition intervention (i.e. interactive lessons, songs, puppet shows) on young children's fruit and vegetable preferences. The study will be conducted at two low-income childcare centers in Clarke County, Georgia and will include children

ages 3 to 5. One center will serve as the intervention and the other will be the control. The intervention will include nutrition lessons and tastings for three fruits (blueberries, peaches, kiwi) and three vegetables (beets, sweet potatoes, broccoli). The intervention will be conducted for 6 weeks with one new fruit or vegetable being introduced each week. All nutrition lessons will be introduced by Freggie (fruits + veggies), a fun character that will inspire healthy choices with his Green Machine (fruit and veggie cart). We hypothesize that an entertainment education nutrition intervention will improve young children's fruit and vegetable preferences, which will be measured via a previously validated taste and rate protocol, teacher survey, and parent survey. The results of this study will be used to make recommendations for future nutrition interventions targeting low-income preschool children.

How Can We Create a Sustainable Campus? An Assessment of Students' Awareness and Attitudes toward Food Waste and Sustainability in On-Campus Dining Halls

Emily Edwards, CURO Research Assistant
Dr. Juan Meng, Grady College of Journalism & Mass Communication

Roughly one-quarter of the University of Georgia student body is enrolled in the UGA Food Services' meal plan, which offers unlimited access to five on-campus dining halls. However, a substantial amount of food waste is generated in these facilities each day. Therefore, this study is designed to better understand UGA students' awareness, attitudes, and behaviors towards sustainability practices and food waste generation. Two research methods were employed in this study to investigate the topic. First, the researcher conducted an online survey to collect information from UGA undergraduate students who are currently or have been enrolled in the meal plan. Secondly, in-depth interviews with selected employees at UGA Food Services were carried out. The research findings indicated that while UGA students perceive sustainability as an important issue, they do not general act on these beliefs. Research also indicated that students are generally unaware of Food Services' sustainability practices and thus do not act in ways to engender the success of those practices. Lastly, research suggested increasing awareness of sustainability practices could change student behavior; thus, the findings of the study could point to messaging strategies that can be developed and implemented to change student attitudes and behaviors and ultimately reduce food waste generation on campus.

Purification of Endopolygalacturonase from *Aspergillus niger*

Linda Egbosiuba, CURO Research Assistant
Dr. Carl Bergmann, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

The enzymes produced by fungi that degrade plant cell wall pectin play crucial roles in both agriculture and industry. Crop loss due to phytopathogenic fungi is a worldwide problem. Dr. Bergmann's lab studies the biochemistry of cell wall degrading enzymes (CWDE). The goal is understanding the biochemical properties and specificity of these enzymes. Pathogenic fungi use cell wall degrading enzymes (CWDEs) as virulence factors to macerate host tissues both in the establishment and expansion phases of infection. Thus, knowing the mechanisms by which CWDEs function in the host plant cell wall and which proteins are secreted by the fungus during infection is key to understanding the interactions of this pathogen with plants. We focus on endopolygalacturonases (EPGs) from *Aspergilus niger*. EPGs are among the first enzymes produced by the pathogen to break down the plant cell wall. EPGs specifically

hydrolyze polygalacturonate, a major constituent of plant cell wall pectin. *A. niger* is a plant pathogen fungus that has been used as a model organism for studying the role of the pectin degrading enzymes (PDEs) for many years. Dr. Bergmann's lab has centered on the degradation of pectins by fungal enzymes during pathogenesis and plant mechanisms to alter the rate at which that degradation occurs. In order to do this, the lab has been expressing and purifying enzymes from *A. niger*, some of which are native and some of which are site directed mutants, and to characterize them in terms of purity and relative activity. Last spring I successfully worked out the methodology to purify *A. niger* EPG-I. I will be continuing the work on this enzyme and will characterize the pectin cleavage by this enzyme and identify the product of this enzyme.

Technique of Soil Fractionation for AMS Radiocarbon Analyses

Rachel Ehlinger
Dr. Alexander Cherkinsky, Geology, Franklin College of Arts & Sciences

On earth, soils hold more carbon than any other component of the carbon cycle, including the atmosphere. Fractionation and accelerator mass spectrometry are used to study the turnover of the organic matter in soil from its death in the biosphere to its decay into the atmosphere. In order to successfully radiocarbon date the matter in samples, the sediment must be converted to a form suitable for measuring carbon 14. Our study analyzes different carbon pools, including bulk composition, humic acid, and residue of the sediment. These pools are separated through different chemical processes in order to evaluate the mean residence time of the samples through mass spectrometry. The mean residence time allows us to calculate the age of the soil and measure its tendency to react to climate change.

Male Mate Choice between Sympatric and Allopatric Populations of *Drosophila subquinaria* and *Drosophila recens*

Randall English, CURO Graduation Distinction
Dr. Kelly Dyer, Genetics, Franklin College of Arts & Sciences

In a system of two species of fruit flies native to North America, *Drosophila subquinaria* and *Drosophila recens*, which have come into secondary contact since speciation, we examined the role that male mate choice plays in asymmetrical reproductive character displacement between *Drosophila* populations of the same species for both *D. subquinaria* and *D. recens*. For each species, we used males from sympatric and allopatric populations, which were individually placed in chambers with a choice of a manipulated fresh female corpse from either population to observe the patterns of their mating behaviors. We found that in *D. subquinaria*, both sympatric and allopatric males tended to pay more attention to their own population, but found that sympatric *D. subquinaria* males were choosier and less active than allopatric males. In *D. recens*, however, neither sympatric nor allopatric males tended to choose one female population over the other with significance.

Comparison of Spinal Motions Used during Running to Their Spinal Flexibility

Cristian Escalera, CURO Research Assistant
Dr. Kathy Simpson, Kinesiology, College of Education

Understanding the biomechanics of the spine that occur during running could be useful in developing rehabilitation plans for spinal-injured patients. The goal of this study was to compare the spinal motions used during running to individuals' spinal flexibility. For 20 participants, the spatial locations of the reflective markers placed on the spine and body were recorded by a motion capture system while the participant ran at maximum

speed and then performed maximum spinal flexion tasks. More spinal motion occurred in the lower compared to the upper half of the spine, with spinal twisting exceeding the corresponding static flexibility value. This implies that running at maximal speed could potentially be problematic for people with low-back problems.

Characterization of Leigh's Syndrome Patient Human Induced Pluripotent Stem Cells for Clinical Research

Christina Ethridge, CURO Research Assistant
Dr. Franklin West, Animal & Dairy Science, College of Agricultural & Environmental Sciences

Background: Leigh's Syndrome is an inherited disorder of mitochondrial energy metabolism that affects the central nervous system. Symptoms include muscular and neurological degradation leading to death within the first few years of life. No curative treatments are currently available. The reprogramming of mitochondrial diseased fibroblasts into induced pluripotent stem cells will allow for their differentiation into multiple cell types and tissues. If reprogramming is possible, this will function as an invaluable tool for studying disease pathophysiology *in vitro* with the intention of designing future gene therapies and pharmacological treatments for affected patients. *Objective:* Our goal in this study was to generate and characterize induced pluripotent stem cells (iPSCs) derived from skin fibroblasts of Leigh's Syndrome patients. *Methods:* Generated LS-iPSCs using a non-viral, non-integrating mRNA and microRNA system, then characterized iPSCs using immunofluorescence staining for pluripotency markers (Oct4, Sox2, Nanog, Tra-181, Tra-160, and SSEA4). iPSCs were differentiated and stained for endoderm (VIM, AFP), ectoderm (MAP2, TUBB3), and mesoderm (ACTA2, Desmin) germ layer markers. *Results:* The generated LS-iPSCs expressed markers of pluripotency as seen by immunofluorescence staining. Differentiated iPSCs staining showed expression of tissue markers from all three germ layers. *Conclusion:* Characterization of the iPSCs derived from Leigh's Syndrome patient fibroblasts demonstrated that the LS-iPSCs possess characteristics of true stem cells.

Effect of O-GlcNAc Expression on Cancer Stem Cells and the Role of LGR6

Sarah Evans, CURO Summer Fellow, CURO Research Assistant
Dr. Michael Pierce, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Studies have shown that colon cancer stem cells are subject to regulation by post-translational modification, such as by glycosylation. The addition of the monosaccharide O-linked ß-N-acetylglucosamine (O-GlcNAc) to serine or threonine residues on proteins by the enzyme OGT and its removal by OGA have been seen to cycle in response to cellular changes. It has been shown that changes in O-GlcNAc may regulate oncogenic signaling in cancer stem cells, and an elevated expression of O-GlcNAcylation has been found in some tumors, such as those of breast and colon cancer. O-GlcNAc has also been shown to play a role in the epigenetic regulation of some genes and has been implicated in the regulation of stem cells by modifying transcription factors. In particular, the gene LGR6 was found to be hypermethylated in colon cancer and may function as a tumor suppressor. The goal of this study is to determine if LGR6 levels are directly affected by a change in expression of O-GlcNAc in colon cancer stem cells. This objective will be carried out by performing a Western Blot to compare control samples to samples of colon cancer stem cells with OGT knocked out. Cancer stem cells are known to drive tumor formation, progression, and recurrence, and have also been shown to contribute to resistance to chemotherapy and radiation treatments. The results of this study will

provide a basis for studying the potential of OGT as a target for small molecule therapeutic development in colon cancer.

Escherichia coli Uses an IlvA/TrpD-Dependent Mechanism for Thiamine Synthesis

Kristen Farley, CURO Research Assistant, CURO Graduation Distinction
Dr. Diana Downs, Microbiology, Franklin College of Arts & Sciences

Phosphoribosylamine (PRA) is an intermediate in the biosynthesis of both thiamine and purines in *Escherichia coli* and *Salmonella enterica*. PRA is synthesized by the enzyme phosphoribosylpyrophosphate amidotransferase (PurF), and a null mutation in the gene encoding PurF leads to a purine auxotrophy in both organisms as expected. Despite the conservation of metabolic components between *S. enterica* and *E. coli*, *purF* mutants of *E. coli* are able to synthesize sufficient thiamine for growth, while *S. enterica purF* mutants are conditional thiamine auxotrophs. The conditional auxotrophy in *S. enterica* has been exploited to identify and characterize multiple alternative mechanisms of PRA formation that can be enhanced by mutation. This study was initiated to determine if PurF-independent mechanism(s) of PRA formation used by *E. coli* share characteristics with those identified in *Salmonella*. Nutritional studies with *E. coli* mutants lacking PurF showed that addition of isoleucine decreased the growth of these strains in the absence of thiamine (i.e. reduced PRA formation). This and other nutritional characteristics suggested that PRA was formed by a pathway of recruited enzymes that was defined in a *ridA* mutant strain of *S. enterica*. In this pathway, an enzyme from isoleucine biosynthesis and one from tryptophan biosynthesis are involved. Specifically, the 2-aminocrotonate intermediate formed by threonine dehydratase (IlvA) is used by the TrpD enzyme to generate PRA. Genetic studies described here revealed that the IlvA-, TrpD-dependent pathway defined in *Salmonella* is functional and highly integrated in the metabolic network of *E. coli* even when the RidA protein is present. These data indicate the metabolic makeup of *Salmonella* and *E. coli* are distinct enough to cause significant growth differences. Labeling studies following the incorporation of threonine into PRA will further probe the use of this mechanism for thiamine biosynthesis by *E. coli*. Studies like these emphasize the fact that different metabolic network configurations can be achieved while using the same components, which is important for evolutionarily related organisms that inhabit separate niches like *S. enterica* and *E. coli*.

The Effects of Ethinylestradiol and Levonorgestrel on the Central Nervous System and Behavior in Rats

Nathan Farr, Foundation Fellow
Jean Simone, Graduate Student
Dr. Philip Holmes, Psychology, Franklin College of Arts & Sciences

This represents the ideas and work of Jean Simone and Philip Holmes. My writing serves to consolidate and summarize the research for the express purpose of my own learning rather than to introduce new ideas or present those ideas as my own. Synthetic chemical contraceptives are the most commonly utilized form of reversible female contraception. Such drugs prevent pregnancy by modifying levels of gonadal steroids. Ample research details the somatic effects of such drugs, and a large body of work defends the benefits of restoring normal levels of circulating gonadal steroids, for example in post-menopausal women. Yet the literature fails to explain the effects that chronic use of chemical contraceptives may have on behavior and its underlying neurochemistry. To this aim, a single dose of ethinylestradiol, levonorgestrel, or saline vehicle was administered subcutaneously to

female Sprague Dawley rats daily. Rats were then tested in novel object (NOR), place (NOP), and context (NOC) recognition paradigms to assess learning and memory. Rats were also evaluated using the rotarod performance test to assess balance and coordination. Serum estradiol and ovarian weights were measured and brain tissue was preserved for analysis of tyrosine hydroxylase (TH) and gonadotropin-releasing hormone (GnRH) by ELISA method. No significant effects of drug treatment were found for NOP. Low dose (10 μg/day) ethinylestradiol impaired NOR while high dose (30 μg/day) improved performance. Low dose (20 μg/day) levonorgestrel improved NOC performance while high dose (60 μg/day) impaired it. All drug treatments lowered estradiol levels. Future studies anticipate the use of immunohistochemistry and other assays to inquire into a possible mechanism for the effects seen in the behavioral studies.

Insects in Shakespeare's Works

Giselle Fernandez
Dr. Fran Teague, Theatre & Film Studies, Franklin College of Arts & Sciences

My research explores the effects of insects on Shakespeare's life and works. When it comes to the past, bugs are usually the ones responsible for huge changes in populations—whether those changes are massive amounts of death, like the plague and famines caused by harvest failures (usually due to bugs), or large boosts in population brought on by bounteous harvests and surpluses of food. Just these few things are integral in several of Shakespeare's most popular plots and themes: the plague that prevents Friar Laurence from delivering a life-changing letter in *Romeo and Juliet*, along with the many feasts that are mentioned and hosted in many of Shakespeare's plays, for starters. People are captivated and repulsed by insects, and their enchanting nature as well as their ability to destroy has never ceased to affect us. In Shakespeare's *A Midsummer Night's Dream*, the fairies with insect-like features and abilities are creatures of intrigue and magic, and butterflies are mentioned as things of wonder and beauty, while in the very same play, other insects such as beetles are described as frightening and harmful things. Insects have all sorts of influence over our lives today, and they have shaped and molded history into the present. Insects are far more important than most people realize, and a small (but very powerful) part of that importance is in Shakespeare's works, which stand at the very base of Western theatre as we know it today.

Evaluating Pre-Medical Students' Experience with/Understanding of Autism Spectrum Disorders

Allison Fialkowski, CURO Honors Scholar, CURO Research Assistant
Dr. David Gast, Communication Sciences & Special Education, College of Education

One in 68 children is diagnosed by age eight as being on the autism spectrum according to the Centers for Disease Control and Prevention (Baio, 2014). Because autism spectrum disorders (ASD) and co-morbidities frequently associated with ASD result in more healthcare visits for those with ASD than for their neurotypical peers, those working in healthcare need to have a high comfort level and understanding of ASD to ensure this population receives adequate care (Gurney, McPheeters, & Davis, 2006; Liptak, Stuart, & Auinger, 2006). Research supports that the earlier in a medical student's education the student is introduced to psychological concepts, the more the student will integrate psychological concepts with clinical ones (Williams, Milton, Strickland, Ardagh-Walter, Knapp, Wilson, et al., 1997). In order to evaluate pre-medical students' comfort level and experience working with those with autism, I have developed a survey using Qualtrics software. Using the results of this

survey, I will analyze the data to see what resources pre-medical students may need and would use to obtain information about autism. In providing adequate, relevant information about autism, students will be able to integrate these psychological concepts into their learning prior to formal medical education.

The Role of Executive Functioning in Adherence for Pediatric Solid Organ Transplant Recipients

Kelsie Flanigan, Charlotte Goldman, Tyler Stollman
Graduate Students: Ana Gutierrez-Colina, Cyd Eaton, Julia LaMotte
Dr. Ronald Blount, Psychology, Franklin College of Arts & Sciences

Executive functioning (EF) involves higher-level cognitive skills, including those needed for planning and management of tasks. Pediatric transplant patients are responsible for maintaining a complex medical regimen, which often involves taking different medicines multiple times a day. As a result, those who have problems with EF may be at a higher risk for nonadherence. No prior research has considered EF in this population or how it might affect medication adherence. The purpose of this study was to measure EF in a sample of adolescent and young adult transplant recipients and explore possible relationships between EF, adherence, and barriers to adherence. Thirty-six participants (M age =16.64) with a solid organ transplant (heart, liver, or kidney) and their caregivers (M age= 54.64) were evaluated in this study. Participants completed both self- and caregiver proxy-report measures of EF, medication adherence, and barriers to adherence. T-test analyses indicated more difficulties with EF in adolescent and young adult transplant recipients than in members of a normative sample (M difference -14.61; $t(35)=5.9$; $p<.000$). Forty-seven percent of participants had clinically significant problems in EF. Further analyses demonstrated positive correlations between EF problems and barriers to adherence ($r= .39$, $p< .05$), and also between EF problems and nonadherence ($r= .43$, $p< .05$). Early detection of deficits in EF could pinpoint individuals at risk of nonadherence. Finally, future studies in EF could lead to early identification of patients at risk for nonadherence and to the creation of adherence interventions designed to improve medical outcomes in this population.

Metabolism and Blood Flow in 4 Regions of the Gastrocnemius

Alyssa Ford, CURO Research Assistant
Alia Church, CURO Research Assistant
Dr. Kevin McCully, Kinesiology, College of Education

Purpose: To measure blood flow, metabolism, and oxidative capacity in four locations (lateral, medial, proximal, distal) of the gastrocnemius muscle during progressive exercise. *Methods:* A four-channel near infrared spectroscopy device was used to simultaneously measure oxygen saturation of hemoglobin in four locations. Plantar flexion was performed for 280 seconds at three levels of resistance. After exercise, blood flow was measured using a venous (65 mmHg) occlusion and metabolic rate using an arterial (250+ mmHg) occlusion. Following a short bout of plantar flexion, muscle oxidative capacity was measured as the rate of recovery after muscle oxygen consumption (mVO2). Rapid inflation of a blood pressure cuff was utilized to measure mVO2 at least 20 times during recovery. *Results:* Blood flow and oxidative capacity remained constant in each region during rest and progressive exercise, while metabolic rate increased with increasing exercise intensity. The proximal portions of the gastrocnemius had higher metabolic rates than distal. The lateral portion had higher metabolic rates than the medial in their respective portions (proximal and distal). *Conclusion:* Simultaneous measurement of

metabolism and blood flow in four locations in the same muscle was successfully performed. The gastrocnemius showed a 5-6 fold increase in metabolism during progressive exercise. Based on preliminary analysis, proximal regions of the gastrocnemius do more work during progressive exercise than the distal portions. Blood flow is restricted in the medial region of the gastrocnemius when compared to the lateral during exercise. Future studies can use this approach when studying muscle or cardiovascular disease.

Image Effects on Young Women's Perceptions and Engagement in Healthful Behaviors

Sophie Frankham-Smith, CURO Research Assistant
Dr. Maria Len-Rios, Grady College of Journalism & Mass Communication

This paper will investigate whether images that depict healthfulness as sexy and alluring can actually have unintended effects on young women's motivations and feelings about engaging in healthful behaviors. Health communicators use visuals to increase audience understanding of health problems, assess health risks, and to make the information more personally relevant. Visuals may increase emotional response to the health message, increase satisfaction with the communication, and aid in information recall (Frish, Camerini, & Schulz, 2013). The purpose of this research is to use an experimental design to pick apart how these "typical images" that accompany text on health promotion fliers and emails aimed at young women may, in the short-term, affect participants' body image attitudes, information recall, message satisfaction, and perceived ability to self-regulate one's health behaviors. This research will manipulate images of females (beautiful/sexy, fit/muscular, average, and overweight) accompanying health information intended for late teens. This research is guided by Bandura's social cognitive theory and Festinger's social comparison theory. Exposure to less fit and attractive bodies should be more motivating to females with lower body image. Individual factors are expected to moderate the effect (e.g., body dissatisfaction, mood). The experiment will be conducted with college-age females ages 18-19. This research is significant because it will add to how public relations professionals should use images in health messaging to most effectively share their message and engage women in healthful behaviors.

Cutting Commercial Energy Costs in Atlanta – One LED Retrofit at a Time

Shreya Ganeshan, Ramsey Scholar
Dr. Meghan Skira, Economics, Terry College of Business

The city of Atlanta prioritizes energy efficiency and sustainability among office spaces, and, in 2012, adopted the DOE's Better Buildings Initiative to reduce energy and water consumption by 20% in 2020. Currently, lighting upgrades to efficient technologies target halogen, incandescent, and old T12-fluorescent fixtures, upgrading them to newer T8-fluorescent bulbs. However, even buildings that have undergone renovation do not operate at optimal efficiency. Because lighting is the lowest hanging fruit in terms of decreasing electrical energy demand, LED lighting, the most efficient commercial technology, should replace existing lighting to maximize efficiency. LED lights have longer lifetimes than other bulbs and emit brighter light, reducing the required number of bulbs per square-foot of office space. Cost-benefit analyses indicate that through four-year phase-ins (typical payback period for LED retrofits) commercial developers should benefit from returns on investments, even after the first year because LED bulbs annually cost less than alternatives. First

performing LED retrofits on participants in the Atlanta Better Buildings Challenge (BBC) will allow the 111 (out of 129) offices already approved for or undergoing renovation to reduce energy consumption by 20% before or by 2020. These offices will serve as leaders and case studies, allowing commercial developers to extend this proposal to their other properties requiring renovation. In the long run, implementation should attract more manufacturers of LED products into the market to reduce installation costs and drive down the price of energy efficient technologies to the point where higher efficiency standards can be enforced through future commercial building codes.

GATA Transcription Factors Substituting HANABA TARANU in *Arabidopsis* Embryo Development

Julian Gendreau, CURO Research Assistant
Dr. Wolfgang Lukowitz, Plant Biology, Franklin College of Arts & Sciences

The GATA transcription factor HANABA TARANU (HAN) is a known regulator of flower, shoot apical meristem, and more recently embryo development. Recent unpublished work has found that the GATA transcription factor HAN functions redundantly with two closely related GATA factors, HAN LIKE 1 (HANL1) and HAN LIKE 2 (HANL2), in embryo development. Knockouts for HAN, HANL1, and HANL2 together produce embryos with striking defects: they fail to form a shoot or root and accumulate abnormally enlarged cells around their periphery, eventually arresting. My research is aimed at understanding whether other members of the GATA family of transcription factors might also play a role in embryogenesis. I have conducted gene swap experiments in which the following eight factors – GATA29, GATA16, GATA17, GATA17-LIKE, GATA22, GATA21, GATA23, and GATA1 – were placed under the control of the HAN promoter and expressed in triple mutants. Preliminary results indicate that GATA29 rescues the triple mutant phenotype and is biochemically equivalent to other HAN genes. We are currently conducting experiments to identify whether this factor plays a role in embryogenesis.

Parenting Intervention Targeting Emotion Communication: Characteristics of Completers and Non-Completers

Jessica Giannotti, Elizabeth Tiarsmith
Dr. Anne Shaffer, Psychology, Franklin College of Arts & Sciences

This study aims to explore differences in parenting characteristics between mothers who completed a parenting intervention versus mothers who enrolled in the parenting course but dropped out early. The 6-session parenting intervention course (Shipman & Fitzgerald, 2005) aimed to improve emotion communication between the mother and child, with a goal of preventing emotional maltreatment. Consistent with past research, we expected that mothers reporting higher levels of stress and emotion dysregulation and more external locus of control, would experience less treatment engagement and thus be more likely to drop out of treatment. We also sought to compare baseline emotion communication skills between treatment completers and non-completers. Our hypotheses were tested using independent *t*-tests to compare treatment completers (n=20) and non-completers (n=10) from a sample of mothers and school-aged children. There were no group differences on mother or child age, mother education, or household income. Results indicated a marginally significant difference in emotional regulation ($t(28)$=-1.71, p=.09), with treatment completers reporting more problems regulating their emotions compared with non-completers. There were no group differences on locus of control or parenting stress. Mothers who completed the intervention reported higher

baseline levels of emotion coaching on all emotional scales, although the difference was only statistically significant ($t(28)=-2.79$, $p=.01$) regarding coaching of fearful emotions. Results suggest that mothers who stay engaged with the course report both strengths (i.e., greater emotion coaching) and vulnerabilities (i.e., higher emotion dysregulation). Further analyses will investigate potential group differences in observations of parent-child interactions completed at the baseline assessment.

Examining Perceptions and Expectations of African American Faculty and Students

Victoria Glover
Dr. Rosemary Phelps, Counseling & Human Development Services, College of Education

Researchers have documented the importance of African American faculty members and mentors in the retention and graduation of African American undergraduate students. Scholars have also identified mentoring as a positive factor in the retention and completion rates of students attending postsecondary institutions (Blackwell, 1989; Faison, 1996; Lee, 1999). Many higher education institutions, especially Predominantly White Institutions (PWIs), have focused on the recruitment and retention of faculty of color in order to diversify their institutions, provide different perspectives in the academy, and to provide a more welcoming and inclusive environment for students. Many PWIs have been successful in their efforts to recruit African American faculty and students, and the importance of having African American faculty involved in higher education continues to be evident. Yet, little research has been conducted examining the interactions and mentoring relationships between African American faculty and students. This is especially true when examining the perceptions and expectations that African American faculty and students have of each other in these interactions and relationships at PWIs. As the number of African American faculty and students increases, the lack of information in this area is problematic for several reasons: (a) little is known about the role of perceptions and expectations in the successful and effective outcomes of African American faculty and student interactions, (b) little is known about how these interactions facilitate growth and development for African American students, (c) little is known about best practices in this area, and (d) little is known about how African American faculty think through and frame these interactions. The current study aims to address the gap in the literature in the area of African American faculty and student interactions, especially as it relates to perceptions and expectations of each other in mentoring relationships at PWIs. By examining the views of African American students and faculty about their perceptions and expectations, we may gain new knowledge and insights into what factors may hinder or facilitate these relationships. This presentation will provide an overview of the theoretical underpinnings and research on African American mentoring relationships, discuss findings from the current study with African American faculty and undergraduate students at a Predominantly White Institution, and discuss future directions in this area of research.

Pre-Camp Characteristics Predicting Camp Outcomes for Children with Tourette Syndrome

Charlotte Goldman, Kelsie Flanigan, Tyler Stollman,
Graduate Students: Julia LaMotte, Ana Gutierrez-Colina, Cyd Eaton
Dr. Ronald Blount, Psychology, Franklin College of Arts & Sciences

Camps for children with Tourette Syndrome (TS) are a unique experience for campers to socialize with other children living with the same disorder. However, individual

differences may contribute to children having different camp experiences. The aim of this study was to determine which child characteristics predicted positive camp experiences for children with TS. Pre-camp attitudes towards having TS and self-competence were evaluated as predictors of post-camp outcomes for children who attended Camp Twitch and Shout. Thirty-one children (M age = 12.32 years) with TS participated. Prior to attending camp, children reported on their attitudes towards having TS and perceived social and general self-competence. After camp, children completed the Pediatric Camp Outcome Measure. A hierarchical regression analysis was conducted to identify predictors of post-camp outcomes, with attitude towards having TS entered in Step 1 and social and general self-competence entered in Step 2. The overall model accounted for 47.8% of the variance in children's camp experience. Attitude towards having TS was found to be a significant predictor of camp outcome, and the addition of social and general self-competence in Step 2 accounted for additional significant variance in predicting camp experiences. However, social self-competence was the only significant predictor at Step 2. These results indicate that children's attitudes towards TS and their perceived social-self competence are predictive of overall camp experience. Conversely, our conclusion indicates that children with lower social self-competence may benefit from extra attention at camp. Finally, additional factors associated with positive camp outcomes should be examined in future research.

Effect of Feeding Method (Breastfeeding vs. Formula) on Postpartum Weight Retention

Randi Goldstein
Dr. Leann Birch, Foods & Nutrition, College of Family & Consumer Sciences

Excessive gestational weight gain (GWG) and postpartum weight retention contribute to obesity among childbearing women. One factor that can affect postpartum weight loss is infant feeding method; the additional energy requirements of breastfeeding can promote postpartum weight loss, especially if infants are exclusively breastfed for several months. *Research Question:* Does the effect of feeding method (breast feeding vs. formula) affect postpartum weight retention? *Methods:* Body weight and body composition data (by BODPOD) were obtained from 12 women at 2, 8, and 16 weeks postpartum; height, initial pre-pregnancy weights, and delivery weights were recorded. The gestational weight gains were compared to Institute of Medicine guidelines. Weight, BMI, %Body Fat, and %Fat Free Mass were analyzed to compare postpartum weight retention loss between groups. *Results:* The sample included 8 participants who exclusively breastfed and 4 who exclusively formula fed. The mean GWG for breastfeeding mothers was 15.6kg, compared to 11.7kg for formula feeding mothers. By 16 weeks postpartum, breastfeeding mothers had lost 3.9 kg and weighed on average 1.4kg above their pre-pregnancy weight, while formula moms had gained 4.1 kg and weighed 7.1kg above their pre-pregnancy weight. *Conclusion:* Although both groups' GWG exceeded the IOM guidelines, by 16 weeks breastfeeding mothers were close to their pre-pregnancy weight, while formula-feeding moms gained even more weight postpartum.

Development of a Lightweight Weeding Robot

Delmaries Gonzalez, CURO Summer Fellow, CURO Research Assistant
Dr. Changying Li, College of Engineering

Nowadays, millions of US dollars are spent in the process of getting rid of weeds by the use of herbicides and manual labor in organic farms. The problem becomes more acute

when many weeds develop resistance to herbicides. To address this important issue, a lightweight robot was developed in this project. The robotic platform used was NI Robotic Starter Kit 2.0, along with a Kinect Sensor to sense depth and color, Arduino Uno microcontroller and a servo motor for the actuators, and a Mintbox 2 PC. Using the Kinect sensor, the robot can detect distance up to twelve feet to avoid any obstacles along its path, as well as detect the color green to differentiate weeds from dirt or plastic mulch. The actuators are made of a spinning brush mounted on a servo motor controlled by an Arduino Uno microcontroller. The navigation is autonomous, using a combination of time intervals and sensors to move along a predetermined path. With the help of the Kinect sensor, not only will navigation be more precise and efficient, but it will provide data on the environment being worked on, which can later be studied and quantified. This lightweight weeding robot provides an alternative to weed control in organic farming, contributing to a more sustainable food production system.

Policy Solutions to Cycles of Poverty and Food Insecurity in Athens, GA

Carver Goodhue, Foundation Fellow
Dr. Susan Tanner, Anthropology, Franklin College of Arts & Sciences

The rate of food insecurity in Athens, GA is significantly larger than both state and federal levels. Food insecurity in Athens can be largely attributed to the high prevalence of poverty, a condition which decreases food security by restricting the financial resources available for food purchases. Food security and poverty are linked in a self-perpetuating cycle; food insecurity can lead to cognitive impairment and poor academic performance in children, reducing income earning potential and reproducing conditions of poverty. There are already several organizations in Athens-Clarke County which address food insecurity. I suggested certain reforms or new uses of these established systems which could more effectively address food insecurity. I created three different policy proposals and examined their theoretical strengths and weaknesses as they related to sustainability, effectiveness, and cost. I chose a final policy which focused on providing nutritious food and nutrition education through school gardens. I judged this policy to be superior to others due to its low cost, high degree of sustainability, and its ability to address nutritional deficits at an early age before they affect educational and professional prospects.

Understanding the Mating Systems of the Fungi Causing Gummy Stem Blight of Cucurbits

Thomas Gottilla, CURO Research Assistant
Dr. Marin Talbot Brewer, Plant Pathology, College of Agricultural & Environmental Sciences

Gummy stem blight of cucurbits, an economically devastating disease, has recently been discovered to be caused by three fungal species: *Stagonosporopsis cucurbitacearum*, *Stagonosporopsis citrulli*, and *Stagonosporopsis caricae*. These species are genetically distinct but morphologically indistinguishable, and may have important biological differences including different mating systems. A critical aspect to understanding mating systems includes an investigation of the mating-type locus (*MAT1*). The *MAT1* locus is conserved among species within the phylum *Ascomycota*, with clear structural differences for self-compatible and self-incompatible species. The objectives to this study are to: (i) identify the *MAT1* locus in all three species, (ii) identify the mating-type genes at each locus, and (iii) compare the mating systems of the three species. Currently, there are draft genomes for three isolates from each of the three species causing gummy stem blight. By cross-referencing the genomes against known mating-type genes, we can identify the *MAT1*

locus. There are two genes in each species responsible for mating type, *MAT1-1-1* and *MAT1-2-1*. The presence of both genes in a single isolate would support self-compatibility; the presence of one gene would indicate self-incompatibility. The locus is likely flanked by the genes *APN2* and *SLA2,* as is the case with most *Ascomycota*. These genes will aid in the identification of the mating-type locus. The structure of the *MAT1* locus for each species is expected to be different, which would further confirm the distinction between these species. Genomic approaches are necessary because mating has not been successfully observed in the laboratory.

Field Test Significance in Adolescents with Chronic Ankle Instability

Morgan Green, CURO Honors Scholar
Dr. Cathleen Brown Crowell, Kinesiology, College of Education

Ankle sprains are the most common sport injuries among athletes and can lead to Chronic Ankle Instability (CAI). Easy to apply, field tests can screen athletes for CAI and assess performance; however, field tests were developed for adults and have not been applied to an adolescent population. The purpose of this study was to determine if functional performance ability is decreased in adolescents with CAI in the single-leg hop test (SLHT), using age as a covariate. We hypothesized that the CAI group would perform significantly slower than the control group, and that age would be a statistically significant covariate. Adolescent soccer players (30 male, 22 female, 15.7±1.4 yrs) completed standardized questionnaires to determine their perceived ankle instability status. Each subject performed two trials of the SLHT, jumping 10 times across a 30cm distance. An ANCOVA analysis was completed ($\alpha<0.05$). The 19 CAI subjects (17.5±4.1s) took significantly longer than the 33 control subjects (11.5±2.8s) ($p<0.001$). Age was identified as a significant covariate at $p=0.004$. Overall, subjects with CAI performed significantly worse in SLHT performance times; however, age appeared to influence performance times. These results demonstrate that SLHT can be used in an adolescent population, while accounting for age, and that CAI in adolescents decreases performance. Future research may assess the use of other field tests in adolescents and the effects of age on performance.

Natural Epigenetic Variation of SVP Results in Acceleration of the Floral Transition in *Arabidopsis thaliana*

Patrick Griffin, CURO Summer Fellow, CURO Research Assistant
Dr. Robert Schmitz, Genetics, Franklin College of Arts & Sciences

With the advent of high-throughput sequencing technologies, the identification of genetic variants and their association with phenotypic diversity is actively being pursued. Largely absent from these efforts is the identification of natural epigenetic alleles (epialleles). From previous experiments, a candidate epiallele was identified in the *SVP* (SHORT VEGETATIVE PHASE) gene of the accession Dja-1, which is a natural strain of *Arabidopsis thaliana* that displays an early-flowering phenotype. *SVP* influences the floral transition in *Arabidopsis*, and mutant alleles of this locus lead to an early-flowering phenotype. Interestingly, the *SVP* alleles are methylated in Dja-1 (hereafter referred to as *SVPepi*) compared to all other surveyed Arabidopsis strains, which leads to the following hypothesis: the methylated alleles of *SVP* in the Dja-1 strain are causative for the early flowering phenotype observed in nature. We have characterized the expression of *SVP* in Dja-1 using RNA-seq, which has revealed that it has the lowest expression in any accession. Furthermore, genetic complementation analysis revealed the Dja-1 allele fails to complement null T-DNA knockout alleles. Treatment with

demethylating agents demonstrates significant reduction of genomic methylation in seedlings; however, phenotypic data of treated adult tissue failed to show significant difference in *SVPepi* expression or flowering time.

Carbon Encapsulated and Magnesiothermically Reduced Diatoms as a Lithium-Ion Battery Anode

Bryan Grommersch, CURO Research Assistant
Dr. Ramaraja Ramasamy, College of Engineering

The chemical technology inherent in lithium-ion batteries has not kept pace with the portable electronics and automobiles that depend on them. Fossilized silica (SiO_2) frustules, or shells, of the fresh-water diatom Aulacoseira feature intricate pores and shapes which make them a promising template for a lithium battery anode. It is believed that retaining these intricacies after a magnesiothermic reduction to silicon and subsequently encapsulating the microparticles in carbon will yield batteries of superior capacity and cyclability.

Multi-Walled Carbon Nanotubes Alter the Acute Toxicity of Diclofenac to *Ceriodaphnia dubia* in Sediment: Water Exposures

Madison Hamilton, CURO Research Assistant
Dr. Marsha Black, Environmental Health Science, College of Public Health

Multi-walled carbon nanotubes (MWCNTs) are a new material with many industrial applications, strong binding properties to hydrophobic compounds, and no demonstrated acute toxicity to aquatic invertebrates at low concentrations. When MWCNTs enter aquatic environments as pollutants, they are predicted to precipitate and interact with sediment but also could bind to water-borne hydrophobic pollutants, reducing their bioavailability to aquatic organisms. Interactions between hydrophobic pollutants, MWCNTs, and sediment could lead to a greater reduction in pollutant toxicity than pollutant interactions with either CNTs or sediment alone. To test this hypothesis sediment elutriate tests were conducted, exposing *Ceriodaphnia dubia* to diclofenac, an anti-inflammatory pharmaceutical with known toxic effects, in the presence of different combinations of sediment, MWCNTs, and natural organic matter (NOM). The greatest reduction in *C. dubia* mortality occurred in the presence of MWCNTs and sediment, resulting in a 25% reduction in mortality compared to the diclofenac exposure. In contrast, the sediment and diclofenac treatment only reduced mortality by 10%. Unexpectedly, the combination of MWCNTs, NOM, and diclofenac increased mortality by 55%, and MWCNTs were clearly visible in the gut tracts of all *C. dubia* in these exposures. Increased toxicity is possibly due to NOM stabilizing CNTs in the water column, allowing for increased interactions between NOM, MWCNTs, and diclofenac followed by consumption of NOM-MWCNT-diclofenac complexes by *C. dubia*. However, sediment decreases the bioavailability of these hydrophobic toxic complexes. Therefore, MWCNT bioremediation efforts should take into account MWCNT stability in the water column and sediment interactions to avoid potential aquatic organism consumption.

Thomas Cole's Architectonic America

Connor Hamm, CURO Summer Fellow, CURO Research Assistant
Dr. Janice Simon, Lamar Dodd School of Art

This research project examines the representations of eclectic architectural forms in the paintings of the early 19th century American landscape painter Thomas Cole. Particular attention is given to *The Architect's Dream* (1840) and his five-part series *The*

Course of Empire (1833-36), which together lament what Cole believed was a faltering America. By examining these six seminal paintings and the representations of Egyptian, Classical, Gothic, and fantastical architectural idioms therein, I propose that Cole blurred the lines between painter and architect and, in turn, between landscape and built environment. I use the following research strategies: (1) formal visual analysis of the paintings themselves; (2) conventional art historical examination of primary/period sources as well as subsequent scholarship; and (3) face-to-face consultation with my mentor. Through such examination of Cole's architectonic paintings, this research project supplements and deepens Cole's artistic legacy as a landscape painter, putting into relief such issues as the relationship between Cole and his patrons, Cole's contribution to the developing American narrative and myth, and Cole's critique of Jacksonian politics. The rendering of architecture is therefore treated as the most apparent and compelling component of Cole's visual jeremiad for America, providing a focused and novel understanding of these paintings and of Cole's oeuvre.

Towards a Parametric Architecture?
Connor Hamm, CURO Summer Fellow, CURO Research Assistant
Dr. Amitabh Verma, College of Environment & Design

This research project examines the architectural philosophy and practice of Parametricism through comparative analysis of two buildings designed by Zaha Hadid Architects: the MAXXI Museum in Rome, Italy and the Heydar Aliyev Cultural Center in Baku, Azerbaijan. I posit that these two buildings allow me to critically examine the growing role of Parametricism as the preeminent architectural style. Comparative examination of these buildings elucidates not only the aesthetic development of Parametricism over the past twenty years (Parametricism-as-style), but also the concomitant structural changes to the built environments of Rome and Baku (Parametricism-as-practice). I use the following research strategies: (1) traditional examination of scholarly materials, including master plans, digital and physical models, architectural reviews, and critical essays; and (2) the design-based methodologies of the Architectural Association Design Research Laboratory, including computational and material analyses, face-to-face critique and feedback modules, and public presentations and critiques. Such robust methodological pluralism allows me to complicate the claim that Parametricism is the architectural style and practice *par excellence*, while also uncovering the ways in which the ubiquity of digital-based design practice has impacted the field of Architecture and the built environment writ large.

The Effects of Size on Development Time and Fecundity in *D. subquinaria*
Joan Han, CURO Research Assistant
Dr. Kelly Dyer, Genetics, Franklin College of Arts & Sciences

Organism body size affects evolutionary fitness by influencing maturation rate, reproductive potential, mating, and life expectancy. To better understand the causes and consequences of body size variation, I investigated the effect of body size on development time and fecundity using two populations of the mushroom-feeding fruit fly *Drosophila subquinaria*. Previous research has shown that flies from west of the Canadian Rockies are significantly larger than flies from the eastern side of these mountains. However, the other physiological characteristics connected to this size discrepancy remain unclear. Through observing the length of time required for flies to mature from time of oviposition to adult emergence out of pupa, I found that the larger population had a longer

development time compared to the smaller one. In addition, by measuring total viable offspring produced by single females, the results showed the larger population to have greater reproductive capacity. This study provides a foundation for further studies on the genetic and evolutionary basis behind body size control. Although larger flies have more offspring, their overall fitness may be hindered by their longer development time. This research may not only help provide insight into mammalian size control due to the similarities between *Drosophila* and vertebrate growth pathways, it may also aid in biodiversity conservation efforts by helping us better understand the mechanisms behind speciation.

Describing Scrambling in Japanese
Spencer Hanlin
Dr. Vera Lee-Schoenfeld, Germanic & Slavic Studies, Franklin College of Arts & Sciences

The syntax of the Japanese language has created controversy in the Japanese community for a number of years due to the rather flexible and somewhat unpredictable nature of its "scrambling" syntax, allowing speakers seemingly to be able to rearrange words and other elements freely. In order to shed some light on the exact nature of this syntactic process, I have conducted a pair of studies to establish a possible set of typologies for possible scrambling sentences and sought native speaker impressions to establish the efficacy of these typologies and what meanings these typologies convey. Based on the data collected and the information gathered from native speakers, I have concluded that there is a significant focus on the use for emphasis and a possible location-focused use that scrambling of sentence elements employs.

Correlation between Narcissism and Turnover within the Workplace
Dennis Hardigree, Alex Cole
Dr. Brian Hoffman, Psychology, Franklin College of Arts & Sciences

This study looks at the relationship between narcissism of chief executive officers (CEOs) and turnover within their companies. The significance of the study is to explore relationships with turnover in an organization in hopes of reducing turnover. We hypothesized that the narcissism scores of the CEOs would be positively correlated with employee turnover. The data were collected via an online survey of Italian company CEOs (N=155) and their followers (N=494). The Narcissism Personality Inventory (NPI-40) was used to measure narcissism of CEOs (Raskin and Hall, 1979), and turnover data was aggregated through AIDA, which records yearly financial records. Narcissism levels of CEOs correlated positively with turnover at 0.78. This finding could have practical implications for the selection process of CEOs.

Hurricane Forecasting and Healthcare Facility Evacuations
Elizabeth Hardister, CURO Honors Scholar
Dr. Curtis Harris, Institute for Disaster Management, College of Public Health

Hurricanes have the potential to produce mega mass casualty and mass fatality events in addition to catastrophic structural damage. The state of Georgia is located in an area vulnerable to hurricanes originating in both the Atlantic Ocean and the Gulf of Mexico; however, Georgia's response to a major hurricane has not yet been tested. The successful evacuation of healthcare facilities in response to an impending hurricane requires advanced notice, timely decision making, and an unprecedented coordination effort between coastal and inland facilities. As a starting point for determining whether

forecasts provide the advanced warning necessary to coordinate evacuations, we evaluated predictive models by comparing historical track data from hurricanes after 1990 to concurrent forecasts. Although emergency managers have benefited from developments in forecasting techniques, the limitations of individual predictive models necessitate special considerations for those that require greater notice for evacuations, specifically patients and residents of healthcare facilities and other individuals with functional medical needs.

Localization of Rv3351c Protein in *Mycobacterium smegmatis* and BCG

Jennifer Hardister, CURO Honors Scholar
Dr. Frederick Quinn, Infectious Diseases, College of Veterinary Medicine

Development of protective strategies against *Mycobacterium tuberculosis* (*Mtb*), a disease that kills nearly 2 million people annually and is the leading cause of death for individuals with HIV, requires an understanding of the mechanisms of host invasion employed by the pathogen. A component of the innate defense of the lung against inhaled infectious agents is the respiratory epithelium. Our laboratory previously showed that *Mtb* strains with mutations in genes *Rv3351c*, *esxBA,* or *hbhA* produce 30-70% less necrosis in human alveolar epithelial cell monolayers compared to the parent strains. Of the products encoded by these genes, only Rv3351c's function is unknown. The long-term goal of this project is to investigate this gene's regulation and its protein product's function. The aim of this current study is to identify the functional location of Rv3351c in the mycobacterial cell using faster-growing and nonpathogenic surrogate hosts, *Mycobacterium smegmatis* and *Mycobacterium bovis*, Bacillus Calmette–Guérin (BCG). To accomplish this task, plasmid vectors expressing *Mtb* Rv3351c will be transformed into these strains. The first vector, pET-19b, contains a polyhistidine tag, which allows for rapid identification by western immunoblots of successfully cloned genes. The second, pMV261, contains an Rv3351c-DsRed fusion that produces a fluorescent product allowing for microscopic analyses. Transformed cultures of the host strains will be separated into cytoplasmic, cell membrane, and secreted fractions and tested for the presence of Rv3351c. The location of the Rv3351c protein product in *M. smegmatis* and BCG provides information for subsequent studies and has implications for the protein's function.

Necessity of Universal Pre-Operative Blood Work in Otherwise Healthy Canines

Kayla Hargrove
Dr. Erik Hofmeister, Small Animal Medicine & Surgery, College of Veterinary Medicine

The objective of this retrospective research study was to determine if performing pre-operative blood work in otherwise healthy dogs influences anesthetic decision making. These decisions include fluid rates, additional procedures, cancellation of surgery, management and monitoring techniques, avoidance of NSAIDs, change in current risk status, changes to client communication, and repetition of blood work. It was hypothesized that few surgeries would be cancelled based on abnormalities, but their effect on other anesthetic decisions would be greater. Cases were identified by the anesthesia records of 100 dogs that underwent elective orthopedic surgeries. Data collected from each case includes: name, age, weight, breed, diagnosis/problem, ASA status, reason for anesthesia, date of procedure, and abnormalities found in blood work. All cases were reviewed by 5 board certified veterinary anesthesiologists. Out of 100 dogs, 0% would have additional surgeries or procedures, 6% would have their procedure cancelled or postponed, 38% would have fluid therapy altered, 31% would have blood work

repeated, 9% would have changes made to monitoring while anesthetized, 50% would have management techniques altered, 12% would have further tests conducted, 10% would have their risk status changed, 42% would have changes in client communication, and 59% would have NSAIDs eliminated from treatment. Results were congruent with the hypothesis. A large number of patients had anesthetic decisions altered on the basis of pre-operative blood work. It is recommended that current blood work requirements remain in place in order to ensure best patient care.

Genetic Determination of Serum Growth Differentiation Factor 15 throughout Lifespan

Elizabeth Harris, CURO Research Assistant
Dr. Robert Pazdro, Foods & Nutrition, College of Family & Consumer Sciences

The Centers for Disease Control and Prevention estimates that 117 million Americans have at least one chronic disease. Cardiovascular disease is the most prevalent chronic condition, especially among people ages 65 and older, causing 1 in every 4 deaths in the United States per year. As the American population steadily ages, it is critical to elucidate the mechanisms by which aging promotes cardiovascular disease. Serum concentrations of growth differentiation factor-15 (GDF15) increases with age and serves as a predictor of cardiovascular disease and all-cause mortality in humans. However, the effect of genetic background on GDF15 levels is undefined. Our hypothesis predicts that genetic background regulates the age-associated increase in circulating GDF15. To test this hypothesis, serum GDF15 levels will be measured in young, middle-aged, and old cohorts of two classical inbred strains: C57BL6/J (B6) and BALB/cByJ (BALB). If our hypothesis is correct, it will demonstrate that GDF15 concentrations and their changes due to aging are genetically-regulated. Success in this study will inform future studies to identify genes and alleles that regulate GDF15 concentrations and, therefore, cardiovascular disease risk in older populations.

Chief Executive Officers' Personality Characteristics and How These Characteristics Affect Marketing in Their Company

Samantha Harris, CURO Research Assistant
Dr. Sundar Bharadwaj, Marketing, Terry College of Business

Our study focuses on the relationship between Chief Executive Officers' (CEOs) narcissistic tendencies and marketing spending (advertising and promotions) undertaken by the companies they are part of. We start with analyzing how narcissistic the CEOs are based on prior scales developed in managerial research. This is done through two studies. The first one entails analyzing each CEO's picture in the annual report based on a number of characteristics, such as the size and positioning of the picture within the report and the presence or absence of other executives in it. The second study is an in-depth analysis of each CEO's "Letter to the Shareholders," investigating the ratio of single to plural personal pronouns. In terms of statistical analysis, we use a multivariate regression approach in order to study whether narcissism exhibited by the CEO is associated with an increased marketing spending, as our hypotheses suggest. We control for a number of different variables, such as firm size, CEO compensation orientation, CEO stock ownership, and CEO tenure at the firm. Overall, we aim to contribute towards a deeper understanding of the impact of chief executive officers' personality characteristics on marketing. Our predication is that if the CEOs are more narcissistic, then they tend to spend more on marketing, even if this is not in the best interest of the firm.

Investigating Resting State Oscillatory Dynamics Associated with Schizophrenia and High and Low Cognitive Control

Rachael Hart
Graduate Students: Anastasia Bobilev, William Oliver, Matthew Hudgens-Haney, Lauren Hayrynen, David Parker
Peter Buckley, MD, Dean, Medical College of Georgia, Georgia Regents University
Dr. Brett Clementz & Dr. Jennifer McDowell, Psychology, Franklin College of Arts & Sciences

Individuals with schizophrenia (SZ) have cognitive deficits that manifest in poor performance on tests of executive function compared to healthy persons. Levels of executive function are associated with performance on working memory capacity (WMC) tasks. Performance on these tasks varies greatly within healthy populations and, similarly to persons with schizophrenia, those with low WMC perform poorly compared to high WMC individuals. This study examines differences in resting state neural activity between persons with schizophrenia and healthy subjects with high and low WMC. In the current study, WMC was determined by a conglomerate score based on performance on computerized operation-, symmetry-, and reading tasks. Persons with schizophrenia, as well as healthy individuals with high and low WMC scores, completed a five-minute eyes-open resting state paradigm while 142 Sensor magnetoencephalography (MEG) data were collected. Time-frequency analysis of resting state activity demonstrated differences in activation between all groups (SZ, High WMC, and Low WMC) across frequency bands. The Low WMC group exhibited commonalities with both the High WMC and SZ groups. Notably, High WMC demonstrated regionalized power differences in the alpha frequency band (8-12 Hz) compared to both Low WMC and SZ groups. Future analyses will employ additional statistical tools to further elucidate differences in oscillatory dynamics across groups. Results from this study suggest that frequency-specific intrinsic activity may markedly contribute to differences in working memory capacity in both healthy persons and those with schizophrenia, while other features of intrinsic activity may be distinctly characteristic of schizophrenia.

***The Motion Picture Story Magazine*: Early Niche Markets, "Fan Communities," and Multi-Platform Transmedia Storytelling in the 20th Century**

Chelsea Harvey, CURO Research Assistant
Dr. James Hamilton, Grady College of Journalism & Mass Communication

This exploratory study seeks to explore how advertisers construct and encourage the creation of "fan communities" for particular products and industries, taking advantage of niche markets and consumer enthusiasm. It also examines the extent to which consumer communities were involved in professional content creation prior to the emergence of the Internet. My research mentor and I analyzed a random sample of nine issues from the 1911 and 1912 publications of one such film industry fan magazine entitled *The Motion Picture Story Magazine*, and placed relevant content, editorials, and advertisements into different categories of reader (or "user") involvement. Results identify "supplier" and "contributor" as the most frequent forms of user involvement by far. The study suggests that the early cinema fan communities organized and aggregated by fan magazines engaged in a form of multi-platform storytelling and the movie industry that went far beyond simply viewing movies. This study lends credence to the claim that convergent storytelling is a long-standing phenomenon, and not only a recent one made possible only via online or digital innovations in technology and media platforms. Furthermore, this study suggests how filmmakers and advertisers used early film fan magazines like *The Motion Picture Story Magazine* to create the consumer

communities that would best benefit them, introducing ways for audiences to interact with films across multiple platforms and in creative ways more than a century before the emergence of digital transmedia.

Effectiveness in Curing Existing Intramammary Infections and Preventing New Cases in Bred Holstein Heifers

Courtney Haviland, CURO Research Assistant
Dr. Stephen Nickerson, Animal & Dairy Science, College of Agricultural & Environmental Sciences

Bacterial infections in the cow's udder result in mastitis, the chronic inflammation of developing milk-producing tissues. Protecting these tissues during the greatest development of the mammary gland (1st gestation) from pathogenic bacteria will guarantee maximum milk production. Nonlactating cow antibiotics are effective in curing infected mammary quarters and preventing new cases of mastitis in uninfected quarters. In addition, teat sealant products have proven effective in preventing new infections and in reducing the chances of contracting clinical mastitis at the time of calving. For this study, mammary secretions were collected from bred heifers prior to treatment and processed for bacteriology, differential leukocyte counts, and total white blood cell counts (WBC) to determine initial infection status. Four treatments (untreated control, nonlactating cow antibiotic, teat seal, and nonlactating cow antibiotic + teat seal) were administered to each of 23 heifers 30-60 days prior to expected calving date. Responses to treatment were monitored at 3 and 10 days postpartum. Significant treatment differences for cure rate, new intramammary infection rate, and WBC were determined with PROC GLM (SAS 9.3). Compared to the control, use of antibiotic and antibiotic + teat seal resulted in higher cure rates ($P<0.05$); no differences were observed among treatments for new intramammary infection rate. Compared to the control, use of antibiotics, teat seal, and antibiotic + teat seal resulted in lower WBC on day 3 postpartum ($P<0.05$). Results demonstrated that treatment with antibiotic, teat seal, or antibiotic + teat seal resulted in less mastitis and lower WBC after calving.

An Overexpression Screen to Determine How *Legionella pneumophila* Effector Protein LegC7 Disrupts Class C Tethering Complex Formation

Chetan Hebbale, CURO Research Assistant
Dr. Vincent Starai, Microbiology, Franklin College of Arts & Sciences

Legionella pneumophila is a Gram-negative bacterial species that causes a severe pneumonia known as Legionnaires' disease. During infection, *L. pneumophila* secretes nearly 300 effector proteins into host cells in order to evade lysosomal degradation by remodeling the host's membrane trafficking pathways. One of these effector proteins, LegC7, has been shown to be lethal upon expression in the budding yeast *Saccharomyces cerevisiae* by disrupting normal vesicle trafficking and vacuole morphology. It is hypothesized that LegC7's toxicity is dependent on an interaction with one or more endosomal genes due to its disruption of cargo localization that transits through endosomes to the vacuole. I examine the relationship between LegC7 and the Class C Tethering Complexes – CORVET (class C Core vacuole/endosome tethering) and HOPS (homotypic fusion and vacuole protein sorting). The CORVET and HOPS complexes have been identified as a set of universally conserved proteins which are essential for early-to-late endosome transition and endo-lysosomal trafficking pathways by tethering membranes, proof-reading SNARE assembly to drive membrane fusion, and interacting with Rab GTPases. Using homologous recombination, 4 different genes will be overexpressed in yeast: *vps8, vps16, vps21* and *vps41*. By assaying whether

overexpression of CORVET/HOPS subunits can suppress LegC7 toxicity, we can determine which specific subunit(s) LegC7 may have binding interactions with.

Superparasitism as a Strategy to Overcome Resistance in an Aphid-Parasitoid Interaction

Alexander Hedaya, CURO Research Assistant
Dr. Kerry Oliver, Entomology, College of Agricultural & Environmental Sciences

Insects are attacked by many natural enemies, promoting selection for resistant phenotypes in natural populations. Pea aphids, *Acyrthosiphon pisum*, for example, maintain significant variation in resistance to a common parasitoid wasp, *Aphidius ervi*, which may be achieved through intrinsic, aphid-encoded means or infection with the protective bacterial endosymbiont *Hamiltonella defensa*. Both resistance types are found in populations of alfalfa-infesting pea aphids, but it remains unclear whether there are conditional differences between aphid-encoded or symbiont-encoded resistance. It was demonstrated that *A. ervi* can detect and selectively superparasitize (two or more oviposition events) aphids with *Hamiltonella*-based protection to overcome their resistance, but is not known if wasps can overcome aphid-encoded resistance via superparasitism. Recently, we found that another pea aphid parasitoid, *Praon pequodorum*, was not susceptible to either aphid- or symbiont-encoded resistance. Aphids maintaining both types of resistance may, however, benefit when facing this parasitoid. In this study we aim to answer: (1) can *A. ervi* overcome aphid-encoded resistance by superparasitizing aphid hosts? (2) are aphids harboring both aphid-encoded and symbiont-based resistance protected against *P. pequodorum*? The answers to these questions will aid our understanding of the basic biology of aphid-symbiont-parasitoid interactions, which is important for the successful implementation of biological control.

Women's Participation in Non-State Militaries Founded on a Secular or Religious Ideology: The Case of Chechnya and Dagestan, Hamas, The PKK

Sarah Hedges
Dr. Lihi Ben Shitrit, International Affairs, School of Public & International Affairs

Women's involvement in militaries has traditionally been limited to positions of support, not engaging in combat or participating in combat-oriented roles. Over time, especially within the last two decades, external pressures and internal demands have led different militaries to incorporate women more heavily. The purpose of this research paper is to examine the roles of women in non-state militaries or armed groups operating from a primarily secular or religious ideology. Three groups will be studied in depth; this includes the major Islamist militant groups in Chechnya and Dagestan, Hamas, and the Kurdistan Workers Party (PKK) fighting in Turkish Kurdistan. The primary question addressed is whether women's participation is greater in armed groups with a secular ideology or armed groups of a religions ideology. This paper reviews multiple sources that offer extensive research on specific militant groups and their involvement in regional conflicts, recruitment measures, the involvement of women in these organizations, and the response of media and the public to these groups' activities. These sources include academic journals, interviews with family members of female militants, and regional newspapers. The results indicate that non-state militaries with a secular foundation provide more opportunities for women in combat-oriented positions; direct military engagement is often limited, but when women do participate in combat it is primarily through conventional means. Conversely,

religious non-state militaries largely use women in unconventional warfare, meaning suicide bombings. While these non-state militaries varied in the positions available to female members, the motivations that women had for participating in these groups were often similar.

Something Old, Something New? A Postfeminist Analysis of the Myth of the "Big Day"

Kristin Henry
Dr. Belinda Stillion Southard, Communication Studies, Franklin College of Arts & Sciences

In this essay, I perform an analysis of the rhetoric that idealizes the wedding as "the big day" for women, rooted in a history of many traditions of marriage and gender roles that now emerge as sources of feminine empowerment. This analysis focuses on two of the most prominent wedding planning websites in the United States, TheKnot.com and WeddingWire.com. The rhetoric of wedding advertising reinforces standards of successful upper-class, white women and continues to treat femininity as the emblem of female competence, inhibiting diverse images of women through false empowerment. Broadly, this study aims to contribute to studies of the tensions between feminism and femininity in postfeminist media outlets.

The Role of Kinesins in Meiotic Spindle Development in Zea Mays

Amy Hodges, CURO Research Assistant
Dr. Kelly Dawe, Genetics, Franklin College of Arts & Sciences

Cell division is a process in which chromosomes are equally divided amongst two daughter cells. A key component of the cell division process is a family of proteins called kinesins. These molecular motors are responsible for pulling chromosomes apart and collecting them in the newly formed cells. Maize (*Zea mays*) has been used for nearly a century as a model for cytogenetic studies. Two specific kinesins of the maize genome, Kinesin6 (ZM-Kin6) and Kinesin11 (ZM-Kin11), are very similar in structure, though they are expressed in different tissues of the plant. ZM-Kin6 is responsible for properly collecting chromosomes during cell division leading to meiocyte (pollen) formation; mutations in ZM-Kin6 cause errors in cell division leading to multi-nucleate daughter cells. Due to the high homology between the two proteins, we predict that the deleterious effects caused by mutations in ZM-Kin6 can be overcome by the over-expression of ZM-Kin11. A maize line in which ZM-Kin11 is highly expressed was crossed with a ZM-Kin6 mutant line. qRT-PCR will be used to confirm the over-expression of ZM-Kin11 in maize meiocytes, and the spindle morphology of these mutant meiocytes will be visualized using immunolocalization. Because kinesins play such a vital role in cell division, learning more about them will provide more information about this complex process at the core of biology.

Investigating Heat Treatment of Serum and Plasma Samples as a Means to Improve the Detection Sensitivity of Heartworm Diagnosis in Dogs

Katherine Hogan
Dr. Ray Kaplan, Infectious Diseases, College of Veterinary Medicine

Dirofilaria immitis, the canine heartworm, can cause serious and sometimes life-threatening pulmonary and vascular disease in dogs. Diagnosis of heartworm is performed by detecting the presence of antigens secreted by female heartworms' reproductive tracts in the blood of dogs, using either Enzyme Linked Immunosorbent Assay (ELISA) or immunochromatography. False negative results may sometimes occur, resulting in heartworm positive dogs being untreated. False negatives may arise when the antigen is bound in an antibody complex, rendering it

unable to bind to the capture antibody in the test. Recently it was discovered that heat treatment can break up the antibody-antigen complex, thus freeing the antigen and allowing its detection. Heat treatment might therefore be able to eliminate false negative results, thereby improving the accuracy of heartworm diagnosis. In currently published work, serum and plasma were used interchangeably without considering impact on results. To test whether use of serum vs. plasma might impact results following heat treatment, serum and plasma from five dogs of infected, uninfected, and unknown *D. immitis* status were collected and tested. Serum, serum-heated, plasma, and plasma-heated samples from each dog were tested using ELISA. Four dogs yielded results consistent with their known infection status for all sample types. However, the fifth dog yielded positive results for plasma and plasma-heated, but negative results for serum and serum-heated. These results are particularly interesting since this dog had been experimentally infected with heartworms but had not been positive on previous tests. Further research is ongoing to examine this discrepancy in results.

3D Printing the Trefoil Knot and its Pages

Frederick Hohman, CURO Research Assistant, CURO Graduation Distinction
Dr. David Gay, Mathematics, Franklin College of Arts & Sciences

Observing the physical geometry of shapes that are particularly tough to visualize in topology has been made easier by visualization techniques such as 3D printing. The work presented here describes the creation of a 3D printed puzzle of the open-book decomposition of the trefoil knot. The open-book decomposition of the trefoil knot describes an object where the trefoil knot is equivalent to the spine of the book. Typical pages of an ordinary book are rectangular and are joined from one edge to the spine; when the equivalent pages of a book are added to the trefoil knot they become surfaces winding inside and outside of the knot. After working through the mathematical theory behind the creation of the puzzle, imploring various concepts such as stereographic projection, we created and printed primitive models, such as the trefoil knot alone, the trefoil knot plus one page, and the trefoil knot plus three pages spaced equiradially. Using Mathematica, a symbolic mathematics computer programming environment, high resolution 3D models of the knot and pages were created. With the aid of other modeling software, namely Blender, the inclusion of twelve pages was made possible by digitally cutting each page in half. From here, holes were removed from the 3D mesh of each half-page to provide space for small magnets. Once printed, magnets are glued into the holes to allow each page and piece of the knot to join together to construct the desired puzzle. The puzzle can be taken apart and rebuilt in various ways that demonstrate properties of the trefoil knot and the accompanying surfaces. The primitive models have been published on Thingiverse.com: the official website dedicated to sharing user-created digital design files for 3D printing, and have been viewed and downloaded thousands of times. Current results have also been posted on the well-known 3D printing blog MakerHome.com, and Wolfram Community, and were written about by 3DPrint.com and other maker websites.

Cas Protein Function in Adaptation of *Streptococcus thermophilus* Type II-A CRISPR-Cas System

Erin Hollander, Foundation Fellow, CURO Research Assistant
Dr. Michael Terns, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

For bacteria and archaea, constant attack by invading genetic elements requires the evolution of novel defense systems. The

recently discovered CRISPR-Cas system mediates phage resistance through a three-step process of (1) adaptation, involving integration of DNA sequences known as spacers from nucleic acid invaders into CRISPR loci; (2) expression, the transcription of small crRNAs from the loci; and (3) interference, in which crRNAs guide effector complexes to recognize and cleave invaders. Cas genes in the CRISPR locus encode proteins involved in the three stages. The Type II-A CRISPR system in *Streptococcus thermophilus*, a key bacterium used in the dairy industry, has one of the simplest systems with only four proteins. This project focused on delineating the function of these four Cas proteins through the functional testing of mutant strains of *S. thermophilus* with deletions of Cas1, Cas2, Csn2, or Cas9. Phage infection of Cas1 and Cas9 deletion strains resulted in loss of function in spacer incorporation, whereas transformation with and without matching spacers retained function in the Cas1 deletion strain but lost function in the Cas9 deletion. These results indicate Cas1 is involved primarily in adaptation, while Cas9 is involved in defense and possibly adaptation. Additionally, functional testing of a Cas1, Cas2, and Csn2 deletion mutant determined all three proteins were necessary for successful adaptation in *S. thermophilus*. Greater understanding of the Cas genes will give insight into the underlying processes of the CRISPR-Cas system as a whole.

Fighting Pain with Pills: Overprescribing and the Opioid Addiction Epidemic

Erin Hollander, Foundation Fellow, CURO Research Assistant
Dr. Amanda Abraham, Health Policy & Management, College of Public Health

Drug overdose deaths increased 117% between 1999 and 2012. Almost three-fourths of all deaths caused by prescription drug overdoses are caused by prescription painkillers, or opioids (CDC.gov, 2014). Increased opioid overdoses are paralleled by a 450% increase in prescriptions from 2007 to 1991 (HHS.gov, 2008). Overprescribing by physicians enables non-medical use of opioids, either by the prescription holder or more commonly by a friend or family member. Current policy centers on the Controlled Substances Act of 1970, which created a framework of "Schedules" for increased regulation of more abusable substances along with the Drug Enforcement Administration for enforcement ("State-by-State Opioid Prescribing Policies," n.d.). However, the rapidly increasing overdose rate and high societal cost indicate these policies are failing. To combat overprescribing, three policy alternatives were proposed and analyzed along with the status quo: (1) mandate usage of Prescription Drug Monitoring Programs (PDMPs), (2) place a hard time limit on opioid prescription, and (3) crack down on pill mills. After extensive analysis, the first alternative was chosen as the most effective, feasible, and cost-beneficial. All but one state currently has the legislation for or a working PDMP, making implementation smooth. Success stories from states which have independently mandated usage will aid in convincing states as well as doctors that PDMPs are worth the cost and effort. A date would be set by which all prescribers must be enrolled in the program, then after a trial learning period weekly logs of patient and prescription information would be required.

Abundancy and Multiply Perfect Numbers

Jackson Hopper, CURO Research Assistant
Dr. Paul Pollack, Mathematics, Franklin College of Arts & Sciences

Two of the oldest questions left in mathematics are related to perfect numbers: whether there is a finite number of them, and whether any of them are odd. We approach these questions by studying arithmetical

property of integers called *abundancy*, which is the sum of an integer's divisors divided by the integer. A perfect number is a number whose abundancy is two. The abundancy of an integer can be found with a simple formula, given its prime factors, but finding all of the integers with a given abundancy is more difficult. An algorithm called solveBA, available on OEIS, quickly returns all integers less than an upper bound whose abundancies are equal to a given rational number, but the algorithm requires a complete list of multiply perfect numbers up to that bound. It is widely believed that all multiply perfect numbers up to 10^{100} are known, but to our knowledge there is no systematic proof any such list is complete. We begin by generating a complete list up to 10^{100} using a modification of solveBA, then use this list to determine which rational number are the abundancy of integers in that range. Additionally, we use recursive criteria to determine many rational numbers, known as abundancy outlaws, which cannot be the abundancy of any integer. We find that available lists of multiply perfect numbers are complete, but determine the abundancy status of more rational numbers than previously known.

Measuring Willingness to Pay for Sea Level Rise in Coastal Communities of Georgia

Kirstie Hostetter, Foundation Fellow, CURO Research Assistant
Dr. Craig Landry, Agricultural & Applied Economics, College of Agricultural & Environmental Sciences

Forces associated with climate change have caused sea levels to rise at an unprecedented rate with much uncertainty about what the exact magnitude of the rising oceans will be. This makes low-lying coastal areas increasingly vulnerable to flooding and infrastructure damages that put both property and people at risk. Currently, FEMA has a program in place called the Community Rating System that offers reductions on flood insurance premiums in proportion to the amount of mitigation and resiliency measures a community enacts to protect themselves against rising sea levels. Our research uses a survey distributed throughout different coastal counties in Georgia to determine whether or not people are more willing to pay for sea level rise adaptation measures if they receive a message of empowerment as opposed to simply facts about how sea level rise affects coastal communities. We do this by sending people to one of two websites with the same formatting but different uses of rhetoric, and then asking similar questions about their willingness to pay for various levels of adaptation measures. This research question comes from psychology literature that indicates people are more likely to take action against a large threat if they believe that their efforts will actually influence the outcome. We hope that our results will contribute to the effort to enroll more communities in the Community Rating System and encourage a larger demand for sea level rise adaptation measures.

Apicoplast Function in *Plasmodium falciparum*

Nathan Howell, CURO Research Assistant
Dr. Vasant Muralidharan, Cellular Biology, Franklin College of Arts & Sciences

Malaria causes nearly 600,000 deaths each year, and it is a mosquito-borne disease caused by *Plasmodium* parasites. Ongoing development of new anti-malarial drugs is very important because of wide spread drug resistance. In fact, the parasite is already resistant to the frontline drug artemisinin. A key characteristic to look for in potential drug targeting is specificity, particularly when treating humans. The deadly malaria parasite, *P. falciparum,* has a unique organelle known as the apicoplast. The apicoplast is required for the synthesis of isopentyl pyrophosphate (IPP), an essential metabolite that is required for parasite survival, and parasites grown in

the presence of IPP can lose their apicoplast. IPP is the metabolic precursor required for synthesis of ubiquinones, polyprenols, and dolichols. We set out to identify which of these metabolic pathways utilizing IPP are important to the survival of the parasite. It was previously known that the downstream synthesis of ubiquinone is essential, and its requirement for parasite survival can be bypassed through the expression of a yeast enzyme. We discovered that exogenous supplementation with dolichols and polyprenols was unable to rescue parasite growth. We are further testing new drugs that can inhibit the IPP synthesis pathway. These results will eventually lead to the development of new anti-malarial drugs through the identification of ideal drug targets.

Ankle Joint Laxity in Those with Chronic Ankle Instability

Katherine Hsieh, CURO Research Assistant, CURO Graduation Distinction
Dr. Cathleen Brown Crowell, Kinesiology, College of Education

Ankle sprains are the most prevalent sports-related injury, with approximately thirty percent of those injured developing Chronic Ankle Instability (CAI). Ankle ligamentous laxity has been demonstrated in those with CAI. Mechanical laxity may be used to help evaluate effectiveness of treatments and outcomes in those with CAI. The purpose of this study was to determine if differences exist in anterior talofibular ligament displacement between individuals with and without CAI. Twenty-one participants (6 CAI, 15 controls, age=22.5 ± 2.2 yrs, height=169.6 ± 9.6 cm, mass=68.5 ± 13.5 kg) completed the Cumberland Ankle Instability Tool (CAIT) and were classified as CAI if they scored ≤24 and as controls if they scored ≥28. Anterior displacement was measured via an instrumented ankle arthrometer. A 150 Newton force was applied to the ankle joint and the amount of anterior displacement was obtained. Three trials were performed on each limb and the last two trials were averaged. Independent samples t-tests were performed to assess for group differences. No statistically significant differences were found between the CAI (16.7 ± 3.2 mm) and control groups (16.2 ± 2.3 mm, p=0.384). Anterior talofibular laxity does not appear in those with CAI. Calcaneofibular laxity and functional deficits may need to be examined in conjunction with anterior talofibular laxity to diagnose CAI. Understanding ankle ligamentous laxity may help provide clinicians with better rehabilitation strategies for those with CAI.

Design of Novel Reporters for Monitoring CaaX Proteolysis

Jesse Hu, CURO Research Assistant
Dr. Walter Schmidt, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

The CaaX motif is a crucial C-terminal protein motif consisting of a cysteine residue, two aliphatic residues, and one variable residue. The clinical applications of CaaX biology are well documented in the literature. Members of the Ras family of GTPases all contain a CaaX motif and help mediate signal transduction events pertaining to cell growth, differentiation, and survival. Mutations leading to permanent activation of human Ras are found in 25% of all types of cancer, 60% of solid tumors, and up to 90% of pancreatic cancers. The CaaX motif directs addition of an isoprenyl group to the cysteine residue. Canonically, this event is followed by proteolysis between the Cysteine and first aliphatic residue by the Ste24p or Rce1p CaaX protease, and carboxylmethylation by Ste14p. These modifications yield the mature isoprenylated protein. This research seeks to better understand the modifications associated with CaaX motifs. We propose a new "shunt" pathway that forgoes the steps of proteolysis and carboxylmethylation for certain proteins such as Ydj1p. Using the yeast *Saccharomyces*

cerevisiae as a model, we have designed approaches and are building plasmid to be used for monitoring the CaaX proteolysis of Ydj1p, Chs4p, and Nap1p. These plasmids will be used for genetic, biochemical, and biophysical studies. For example, we will evaluate the impact of changing the Ydj1p CaaX motif on the Ydj1p-related phenotypes of temperature sensitivity and mitochondrial function. Similar studies will investigate the impact of changing the Chs4p CaaX motif on chitin deposition through calcofluor binding studies. We will also describe efforts toward purifying the aforementioned proteins for use in mass-spectroscopy studies aimed at identifying the specific modifications occurring to the CaaX motif.

Increasing Adoption of an Internet Standard: Internet Protocol Version 6

Heather Huynh, Ramsey Scholar
Dr. Brad Barnes, Computer Science, Franklin College of Arts & Sciences

Internet Protocol version 6, or IPv6, determines how information is sent over the Internet. Even with the benefits of migrating to Internet Protocol version 6, or IPv6, the United States is still lacking in public adoption of IPv6 as a standard for internet protocols due to the public's reliance on IPv6's predecessor: IPv4. The U.S. government has acknowledged the issue, but their course of action is to promote IPv6 as a standard internally, which means only adopting it within the federal government agencies. This policy isn't detrimental, but it doesn't focus on public adoption of IPv6, which is the most important aspect of IPv6 adoption. Three policy alternatives were evaluated in addition to the status quo: incentives for ISPs to adopt IPv6, incentives for content creators to adopt IPv6, and an extension of the status quo to a small group of businesses. The best way to solve this issue is to get the government to incentivize ISPs to adopt IPv6. This is both the cheapest policy to implement and the policy that will result in the greatest number of people gaining access to IPv6 in the shortest time possible. While the policy has a good chance of accelerating IPv6 adoption, there are still issues like where to get the money to fund this policy as well as how cooperative ISPs will be when implementing this policy; however, the first step to implementing this policy is getting the money to incentivize the ISPs.

Upregulation of Transferrin Receptor in *Trypanosoma brucei*

Stacey Ikebudu, CURO Research Assistant
Dr. Kojo Mensa-Wilmot, Cellular Biology, Franklin College of Arts & Sciences

The bloodstream form of *Trypanosoma brucei*, causative agent of human sleeping sickness, internalizes host transferrin as its primary source for iron through receptor-mediated endocytosis. Uptake of host transferrin is dependent on a heterodimeric transferrin receptor encoded by two genes, ESAG6 and ESAG7, which has no sequence similarity to the mammalian transferrin receptor. Iron is needed by *T. brucei* for viability, making transferrin a crucial growth factor. Levels in both transferrin receptor and transferrin uptake can be regulated in the trypanosome by the iron chelator deferoxamine, thus suggesting that the expression of transferrin receptor may perhaps be regulated by iron availability. This hypothesis was tested by first incubating trypanosomes over a 48-hour period with several concentrations of deferoxamine in order to arrest cell proliferation. Flow cytometry and Western blot were used to quantify transferrin binding to trypanosome transferrin receptors. The ability for *T. brucei* to overexpress its transferrin receptor in iron-limiting conditions may contribute to the ability of the parasite to thrive in different mammalian hosts. Transferrin uptake, due to its importance, may be targeted in anti-trypanosome drug discovery efforts.

Abstracts

The Strategy of the Early British Feminist Movement: Emily Davies and Feminist Networks, 1865-1905

Caroline Jackson, CURO Research Assistant
Dr. Steven Soper, History, Franklin College of Arts & Sciences

The significance of networks among participants in the women's movement of the latter half of the nineteenth century has been largely unexplored. This paper will argue that networks were widespread between women active in a variety of different feminist campaigns, and that they were of vital importance in their successes. Networks were important because they enabled the leaders of feminist operations to acquire powerful contacts and large bases of support. Though there was a considerable variety of views on the appropriate goals of the women's movement, networks helped to create a galvanized generation of women pushing for a more important role in society. Consequently, issues pursued by different organizations – such as greater education and professional opportunity – became linked. There was strategic purpose to the creation of networks: credentialist tactics – appeals to equal rights for the sexes – were often unsuccessful in breaking down male power structures, but they helped to accrue a web of interested parties. The power of combination then aided in legalistic struggles over the creation of female-oriented or female-only institutions. This paper will use the efforts of Emily Davies and her circle in the field of higher education as a case study in feminist networks; it will then gesture towards the importance of these networks in the women's movement as a whole.

Embedded Bi-Directional FBG Curvature Sensor

Aneek James, CURO Research Assistant
Dr. Mable Fok, College of Engineering

The research involves designing and investigating the properties of a Fiber Bragg Grating (FBG) sensor embedded in a silicone material for bi-directional curvature sensing. An FBG optical cable spectral response is affected by the FBG's environment, and thus can be used to sense its surroundings. Unfortunately, FBG sensors are fragile, and existing techniques usually involve the use of a bulky non-flexible fixture, making the FBG based curvature less attractive. Our research involves developing an FBG sensor that is embedded in a silicone material, making the sensor flexible and robust. To investigate this, we will compare the responses of five identical FBG sensors embedded in the material, all at different positions. We then will record the sensors' responses to bending by placing them on seven substrates of varying curvatures (30° to 360°). Through plotting the wavelength shifts versus the curvatures, we can examine the slopes of the curves and see how the experimental sensitivity trend compares to the theoretical model we constructed using the concepts of pure bending and the Bragg wavelength condition. The Bragg wavelength's relationship to curvature is highly linear over a large range of values, and its sensitivity seems related to the sensor's position in the silicone material as well as the bending direction. Our preliminary study shows a very promising breakthrough in bi-directional curvature sensing and this novel FBG sensor has potential uses in civil engineering for structural health monitoring, shape sensing, and biomedical engineering.

The Genetic Basis of Leaf Phenolic Content in Cultivated Sunflowers

Amna Jamshad
Dr. Lisa Donovan, Plant Biology, Franklin College of Arts & Sciences

This research works to understand the genetic basis of variation in leaf phenolics in cultivated sunflower (*Helianthus annuus*).

Phenolics are a diverse group of secondary metabolites, many of which act as effective chemical defenses against herbivores and pathogens. From an agricultural perspective, understanding the genetic basis of leaf phenolics will provide plant breeders with resources to develop more pest and disease resistant crop varieties. This research employed a 288-line association mapping panel of cultivated sunflowers that captures ~90% of the genetic diversity across all crop sunflower varieties. After extracting and preparing the samples, the Folin-Ciocalteu assay was used to quantify total leaf phenolic content, and variation in total phenolics was mapped to the sunflower genome using published genotype data for the sunflower association mapping population. This data was used to evaluate hypotheses about the genetic structure underlying the variation in these traits, including (1) that phenolic content will be associated with many genomic regions of small effect, rather than a few regions of large effect, and (2) that regions associated with total phenolic content will cluster due to shared biosynthetic pathways.

The Predictive Power of Self-Reported Computer Usage on Processing Speed and Reasoning Scores

Kharine Jean
Dr. L. Stephen Miller, Psychology, Franklin College of Arts & Sciences

This study examined computer usage experience in older adults toward predicting processing speed and reasoning scores measured by computerized neuropsychological testing, the CNS-Vital Signs (CNSVS). The participants' ages ranged from 64 to 99 with 28 males and 42 females. Participants were grouped based on their self-reported computer usage: frequent and non-frequent computer users. Processing speed was determined by a Symbol Digit Coding task requiring participants to pair symbols with a corresponding number. Reasoning was determined by a Non-Verbal Reasoning test requiring identification of missing objects based on a pattern within a time frame. Both tasks required participants to use a keypad. An independent samples t-test found no significant difference in reasoning scores between frequent (M=2.19, SD=4.08) and non-frequent self-reported computer experience (M=1.22, SD=4.54; t(68)=.845, p=.401). There was a significant difference in processing speed scores between those with frequent (M=40.73, SD=9.74) and non-frequent computer experience (M=32.39, SD=12.17; t(68) = 2.93, p=.005). Hierarchical multiple regression revealed a near-significant effect of previous computer experience relating to processing speed (2.5% variance accounted, p=.069) when controlling for age and clinical dementia rating. Although findings found no difference in reasoning score means between frequent and non-frequent computer users, it suggests that prior computer familiarity may have some power in predicting processing scores. Findings suggest a need to control for previous experience when giving computer-based tasks to older adults that require more than a basic level of computer-participant interaction.

Tissue Factor-Altered Mice Show Upregulated Pro-Inflammatory Cytokine Gene Expression in Experimental Cerebral Malaria

Tiffany Jenkinson
Dr. Julie Moore, Infectious Diseases, College of Veterinary Medicine

Cerebral malaria (CM) is a devastating neurological condition caused by sequestration of *Plasmodium falciparum*-infected erythrocytes in the brain microvasculature. The disease has a high mortality rate and mainly affects children under 5 years of age. Previous studies have shown a pro-coagulant and pro-inflammatory state in patients with CM. As inflammation and coagulation are known to interact, the effect of altered TF

expression on the production of pro-inflammatory cytokines was investigated in a murine model of CM. Tissue factor (TF), a principle initiator of the coagulation cascade, is dramatically upregulated in areas of excessive fibrin deposition, a hallmark of CM brain pathology. 6-8 week old transgenic female mice were infected with 10^6 *P. berghei* ANKA, a CM-inducing murine malaria species. Mice with a null mutation (1% expression), those heterozygous (50% expression) for mouse TF, and a TNF knockout strain were used for these experiments. Weight, hematocrit, and parasitemia were taken daily, and the mice were serially sacrificed between days 4 and 6 post-infection. Brains were harvested and homogenized, and mRNA expression of several critical pro-inflammatory cytokines was assessed by qPCR, including TNF-a, IL-6, IL-1b, and MCP-1. We suspect that in response to the localized sequestration of infected erythrocytes in the microvascular region of the brain, levels of these inflammatory mediators will be significantly increased. The pro-inflammatory response may elicit a chain of events that lead to increased coagulation and fibrin deposition in the brains of these mice, which would contribute to the breakdown of the blood-brain barrier.

Biosynthesis of Base J

Melissa Jennings, CURO Honors Scholar
Dr. Robert Sabatini, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Trypanasoma brucei (*T. brucei*) is a parasitic protozoa that causes African Trypanasomiasis, aka Sleeping Sickness, in humans. *T. brucei* is part of a larger class called kinetoplastids, which are responsible for other deadly human diseases, such as Leishmaniasis and Chagas' disease, that are found all over the world. These kinetoplastids contain a modified T nucleotide, called base J, which regulates RNA polymerase II transcription and gene expression. Base J is not synthesized in the host, but it is essential to the parasite. By understanding base J synthesis and function, researchers may one day be able to develop a specific treatment that will manipulate base J and kill these protozoa. The initial step of J synthesis is catalyzed by two thymidine hydroxylases, JBP1 and JBP2, which add a hydroxyl group to thymine. The second step of base J biosynthesis involves the addition of a glucose to the hydroxylated thymidine by a glucosyl transferase (JGT). What is unknown about this mechanism is how the enzymes recognize specific regions of the parasite genome and modify the thymidine base. The hypothesis is that J biosynthetic enzymes are part of a larger complex that regulate recruitment to specific chromatin regions of the genome. To address this we will identify proteins that interact with each of the enzymes *in vivo* using two approaches: tandem affinity purification and BioID. We will present current data resulting from recombinant parasite cell lines and the search for JBP associated proteins involved in J biosynthesis.

Social Dynamics Affect Learning of a Technical Skill in Infant Capuchins

Thomas Johnston, Ramsey Scholar, CURO Summer Fellow
Dr. Dorothy Fragaszy, Psychology, Franklin College of Arts & Sciences

In the wild there are instances of nonhuman animals learning skills socially and passing these skills on as traditions. I am interested in the factors that promote or inhibit social learning in young capuchins. In a previous study, captive capuchin monkeys, *Sapajus* spp. developed a technical skill (solving a mechanical apparatus for juice reward) and passed it on as a tradition. The data were collected in twelve 30-minute sessions of video with each of four groups of tufted capuchin monkeys. Because proximity to the

device increases the chances of an infant observing a solution, I examined several factors predicted to affect proximity and in turn affect the time (t1) of an infant's 2nd solution (criterion for mastery). The monkeys' presence near the apparatus and interactions with the vending device were coded using one-zero sampling in ten-second intervals. I first created social network matrices to visualize relationships among members of the group. Second, I examined the factors (age, sex, presence of mother, and/or social status) that affect the frequencies of proximity and other factors related to solving. Third, I fitted a linear model for solutions over nine sessions of one group. Infants appear to interact with the apparatus more often than adults, and nearly all infants achieved mastery. Maternal presence increased infant interaction with the device. Higher status males had higher proximity counts but not more solutions. Infants' solutions increased linearly with time. These findings reveal how social dynamics could affect the learning of a technical skill in infant capuchins.

PCR Detection of SRY Gene of Male Dog Mesenchymal Stem Cells in Female Dog Brains with Acute Ischemic Stroke

Susan Jones, Foundation Fellow
Dr. Elizabeth Howerth, Pathology, College of Veterinary Medicine

Intra-carotid-delivered mesenchymal stem cells (MSCs) may improve functional neurological outcomes after acute ischemic stroke (AIS). However, a large animal model is essential before beginning human clinical trials for patients with AIS. This study uses a dog stroke model in which female dogs with experimentally induced AIS receive male-derived MSCs via intra-carotid injection. It is hypothesized that the MSCs will successfully move to the site of infarction and participate in repair of damaged tissue. The objective of the present study is to target the Y chromosome in order to track the migration of the male-dog derived MSCs to various locations by using PCR. To detect the MSCs, techniques were developed or modified from those in the literature to amplify the SRY gene on the Y chromosome by PCR. These techniques were tested and optimized using male dog bone marrow. Two PCR techniques, an original semi-nested technique and one modified from a previously described technique, were then tested using fresh brain samples from female dogs with experimentally induced AIS that were subsequently injected with male MSCs on the side of the stroke. Both techniques were effective at detecting the Y chromosome in the brain samples and are suitable for tracking male-derived MSCs in this dog model of stroke. The next step of this study will be to modify these techniques for use in paraffin embedded samples using a laser capture technique to specifically identify cells containing the Y chromosome in the area of the stroke.

Regional Sourcing of Obsidian Artifacts through Chemical Analysis (pXRF): A Case Study in Western Canada

Travis Jones
Dr. Jeff Speakman, Director, Center for Applied Isotope Studies

In January of 2015, researchers from the Royal Alberta Museum, Canada, and the University of Georgia's Center for Applied Isotope Studies collaborated on what is arguably the largest chemical analysis of archaeological obsidian via portable X-Ray Fluorescence (pXRF) to date in Western Canada. This technique has been successfully implemented in places such as the Mediterranean, Alaska, and the American Southwest. One region of the world, however, rich with prehistoric artifacts made from obsidian, which has lacked any large scale analysis is Western Canada.
The analyzed sample set consisted of approximately 750 artifacts found in various archaeological contexts throughout Alberta.

Comparing trace element concentrations generated through this analysis with those of known geologic sources provides insight into obsidian procurement and use by prehistoric humans in the region. Preliminary data demonstrate that most of the samples' geologic origins are from known sources in the northwestern United States (primarily Idaho), British Columbia, and Alaska. This study is a first step toward expanding our understanding of human utilization of this historically important natural resource in Western Canada.

Who Saved Thad Cochran?: Racial Politics and Voter Mobilization in a Deep South Runoff

Zachary Jones, CURO Research Assistant, CURO Graduation Distinction
Dr. Charles Bullock, Political Science, School of Public & International Affairs

The June 3, 2014 Mississippi Republican Senate Primary saw State Senator Chris McDaniel defeat 40-year incumbent Senator Thad Cochran with 49.5% of the vote to Cochran's 49.0%. Because neither candidate received a majority, the two were forced into a runoff election three weeks later on June 24. Defying expectations, Cochran defeated the Tea Party-backed McDaniel to secure the Republican nomination. Many claimed that Cochran's unlikely victory was the result of his campaign's appeals to traditionally Democratic African-American voters to "cross over" and vote for Cochran in the Republican runoff. This research investigates those claims, as well as the potential impact of African-American voters on the outcome of the runoff election. Simple linear regression and Pearson-R correlation statistics suggest the possibility of African-American influence on the runoff. A closer analysis using ecological inference provides conclusive evidence that black voters in Hinds County were essential to Cochran's victory. This research also draws upon relevant literature, news articles, and historical data to provide perspective on runoff elections, turnout, and racial voting patterns in the Deep South.

Structural and Cultural Factors Influencing HIV Testing and Risky Sexual Behaviors in Young Liberian Women

Taylor Jordan, CURO Research Assistant
Dr. Tamora Callands, Health Promotion & Behavior, College of Public Health

The civil war in Liberia from 1999-2003 destroyed the nation's political and social infrastructure. The purpose of this study was to examine the structural and cultural factors that influence HIV testing and sexual health outcomes among young Liberian women in order to develop effective and culturally sensitive interventions. Five focus groups with 49 women and 16 key informant interviews were conducted. This qualitative data provided insight into the contexts surrounding gender-based violence, mental health, adolescent pregnancy, and HIV risk sexual behaviors among young Liberian women. The interviews reveal poor education, poverty, and mistrust of the Liberian healthcare system influence HIV testing and sexual health outcomes. Findings also suggest that women's increasing role as the primary breadwinners for their families serves as a major driver of lack of HIV testing and sexual health outcomes.

Role of RGS10 in Regulating Neuroinflammation in Microglia

Mugdha Joshi, CURO Summer Fellow, CURO Research Assistant
Dr. Shelley Hooks, Pharmaceutical & Biomedical Sciences, College of Pharmacy

Microglia are the resident immune cells of the central nervous system. Dysregulation of their inflammatory pathways causes chronic neuroinflammation, which is implicated as a cause for neurodegenerative diseases such as

Multiple Sclerosis, Parkinson's, and Alzheimer's, as well as neuropathic pain. Regulator of G-Protein Signaling (RGS) 10 has emerged as an important suppressor of the microglial inflammatory response. Studies have shown that RGS10 exerts a neuroprotective effect by regulating the NF-κB signaling pathway. The NF- κB signaling pathway is also activated by lipopolysaccharide (LPS), a component of bacterial cell walls and a potent activator of the microglial inflammatory response. LPS binds to Toll-like Receptor 4 (TLR4), which is not a G-protein coupled receptor. Even so, its effect seems to be suppressed by the presence of RGS10. To explain this paradox, we hypothesize that a secondary G-protein coupled receptor (GPCR) regulated by RGS10 intersects with the TLR4 pathway and facilitates LPS induced production of inflammatory cytokines. Through methods of cell culture, transient transfection with siRNA, nuclear fractionation, western blotting, and qualitative real time PCR, this study aims to demonstrate the existence of such a facilitative GPCR and investigates GPR84 as a candidate for this receptor. While results do support the existence of a facilitative GPCR regulated by RGS10, they suggest that GPR84 is not the identity of this receptor.

Integrating of Human Neural Progenitor Cells into a Developing Chicken Embryo for a Toxicology Model

Piyush Joshi, CURO Research Assistant, CURO Graduation Distinction
Dr. Steven Stice, Animal & Dairy Science, College of Agricultural & Environmental Sciences

The goal of this project is to establish a developmental toxicology model system, which can be used in the field of toxicology and regenerative medicine. Human neural progenitor stem cells (hNPs) will be injected into the developing chicken embryo and multimodally tracked with MRI and fluorescence microscopy. To accomplish this, hNPs will be labeled with iron nanoparticle MRI contrast agents and injected into the chicken embryo at stage 15. The cell will then instigate into the central nervous system (CNS) of the chicken. At specific endpoints, the chicken embryo will be imaged to assess cellular integration. When successful, this will provide a novel developmental toxicology model for further studies aimed at assessing the impact of endocrine active compounds (EACs) and other toxins on neural development.

Mechanism of Developmental Regulation of Base J Synthesis in *Trypanosoma brucei*

Megha Kalia, CURO Honors Scholar
Dr. Robert Sabatini, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Kinetoplastids are a group of unicellular flagellate protozoa, some of which cause serious diseases in humans. *Trypanosoma brucei*, causive agent of African sleeping sickness, is spread by the tsetse fly and affects more than 60 million people. A unique feature of kinetoplastids is a DNA modification known as base J. Base J is a hypermodified thymidine that is synthesized in two steps. First, a thymidine residue is hydroxylated into HOMedU by a thymidine hydroxylase (JBP1 and JBP2). Second, a glucose moiety is added by a glucosyl transferase (JGT) to form base J. The life cycle of *T. brucei* can be divided into two main stages: mammalian (bloodstream form) and insect (procyclic form). The mammalian life stage produces base J, but procyclic does not. It is known that the enzymes that synthesize base J are down regulated in the procyclic stage. However, it is unclear if this explains the complete lack of the modified base in the PC life-stage. To address this, we will re-express the enzymes in the parasite and follow the production of base J. An epitope tagged version of JGT was

eptopically expressed in procyclic *T. brucei*. A Western blot analysis showed expression of the tagged enzyme. Our next step is to quantify the levels of base J by doing an anti-base J dot blot. However, while the same construct leads to high levels of the enzyme in BS cells, very little of JGT is produced in PC cells. This suggests an additional level of regulated gene expression in this life stage. Understanding the biosynthesis of base J will help broaden our understanding of this DNA modification in trypanosomes.

A New Analysis Strategy for Designs with Complex Aliasing

Andrew Kane, Samantha Cao
Dr. Abhyuday Mandal, Statistics, Franklin College of Arts & Sciences

In this project we propose a new data analysis strategy for designs with complex aliasing. In many non-regular designs, factorial effects are often partially aliased with each other. Identifying the correct underlying model from the experimental data is a challenge. Both frequentist and Bayesian solutions to this problem are subjective in nature. Here we propose the Lasso (least absolute shrinkage and selection operator) variable selection method to identify the correct model in the presence of complex aliasing. Given a particular dataset generated from a non-regular design, regression methods are commonly used to select the model with the most significant predictor variables. The standard approach for fitting a linear regression is the ordinary least-squares (OLS) method, which minimizes the error sum of squares between the observed and predicted response values. However, OLS does not perform well on high dimensional data, where the number of variables is large compared to the number of observations. On the other hand, Lasso and adaptive Lasso perform variable selection to reduce the number of variables by adding a penalty to the coefficients, shrinking certain predictor coefficients to zero and thereby eliminating extraneous variables. We demonstrate the use of adaptive Lasso techniques on real and simulated datasets to establish the superiority of the proposed technique over standard methods available in the literature.

Republicanism in the American South: From Strom Thurmond to Lindsey Graham

Daniel Kanso, CURO Summer Fellow, CURO Research Assistant, CURO Graduation Distinction
Dr. Charles Bullock, Political Science, School of Public & International Affairs

In order to understand the complex dynamics within the modern Republican Party, its ideological core, and the platform on which its base of voters is built, it is necessary to evaluate the full scope of its development. Throughout American history, South Carolina's national profile has outsized its geographic territory, its significance consistently overshadowing the state's long median-sized population. From 1878 to 1980, more than 85% of the 46 senators and 124 members of the South Carolina House of Representatives caucused with the Democratic Party. Measured Republican electoral growth began in the 1960's, driven by a multitude of factors that parallel South Carolina's development as a state. In the past 115 years, Republicans in South Carolina have accounted for five governors, four U.S. Senators, nineteen members of the U.S. House of Representatives, two majority leaders of the state senate, and two speakers of the house. Although seemingly dominant, the Republican Party is relatively new in establishment in South Carolina and projects a growing identity of republicanism that is visible across the nation. My thesis is focused on the election and governorship of Mark Sanford, who currently represents South Carolina's 1st District in the United States House of Representatives. The GOP

gained control of the South Carolina House of Representatives in 1994, and under Democratic Governor Jim Hodges the South Carolina Senate transitioned to Republican control in 2001. Mark Sanford is the first governor in modern history to oversee a Republican majority in both chambers of the state legislature. I have conducted personal interviews with Mark Sanford, his former Chiefs of Staff Fred Carter, Scott English, and Senator Tom Davis, Sanford's Chairman of the Board of Economic Advisors John Rainey, and his Legislative Liaison Senator Chip Campsen. Additionally, I have interviewed more than 70 individuals involved in South Carolina politics, ranging from Assistant Democratic Leader James Clyburn to Senator Jim DeMint.

Characterizing the Novel 1,2-Propanediol Dehydratase and its Activating Enzyme from *Roseburia inulinivorans*

Suraj Kapoor, CURO Research Assistant
Dr. William Lanzilotta, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Glycyl radical enzymes (GREs) represent a diverse superfamily of enzymes that utilize radical mechanisms to catalyze difficult, but often essential, chemical reactions. In this work, we present biochemical and structural data for the GRE-dependent diol dehydratase from *Roseburia inulinivorans* (RiDD) and the glycerol dehydratase from *Clostridium butyricum* (CbGD). We demonstrate that these enzymes have very different substrate and enantiomer selectivity despite high sequence identity (48%). Specifically, the CbGD catalyzes the dehydration of glycerol and *(S)*-1,2-propanediol but not *(R)*-1,2-propanediol. In contrast, the RiDD does not utilize glycerol but will utilize both *(S)*-1,2-propanediol and *(R)*-1,2-propanediol as a substrate. Interestingly, the RiDD also produces some acetone with either enantiomer of 1,2-propanediol. We also report the crystal structure of the RiDD that, when considered in light of the biochemical data, provides an explanation for the observed substrate and enantiomer selectivity as well as new insight into the radical-catalyzed dehydration reaction of both enzymes. These observations provide a framework for rational enzyme engineering towards the application of GREs in commodity chemical production from renewable resources.

The Effects of Prior Knowledge of Trial Type on Saccade Task Behavior

Megan Kelley
Dr. Jennifer McDowell, Psychology, Franklin College of Arts & Sciences

Rapid eye movements (saccades) are commonly used for studying top-down cognitive control. Following presentation of a peripheral stimulus, two saccadic responses are possible: simple, stimulus-directed prosaccades and more complex antisaccades directed toward the mirror location of the stimulus, which require inhibition of the impulse to look toward the stimulus. This study explored how explicit knowledge of task conditions affected behavior by manipulating the probability (10, 30, 50, 70, or 90%) of antisaccades versus prosaccades in a run, with one group of participants (explicit, n=32) being informed of the probability prior to a run, and a second group (implicit, n=33) remaining uninformed. Thus, the current study examined how cognitive preparation affected latency and proportion of incorrect responses. It was hypothesized that participants would perform better (shorter latencies, fewer errors) on saccade trials when their respective trial type was highly probable compared to runs when each type was improbable. The explicit group was expected to perform better than implicit on high probability trials (e.g. antisaccades in 90% AS run) and the same or worse than implicit on low probability trials (prosaccades in 90% AS run). The preliminary results show that groups

do not significantly differ, implying that knowing the likelihood of a desired response type does not improve performance. This could be because individuals who are unaware of the probability may still be able to determine that the stimuli are occurring in different probabilities and thus may still be cognitively preparing for the appropriate tasks.

Highly Mobile Kenyan Runners: Transnationalism through Sport

Jacob Kennedy, Foundation Fellow
Dr. Jepkorir Rose Chepyator-Thomson, Kinesiology, College of Education

Since the mid-1960s, Kenyans have dominated long distance running. Presently, over 2000 Kenyan runners live, train, and race abroad using various migratory patterns. In recent years academic and public efforts have sought to explain Kenyan running, usually in biological terms. Yet, few studies have examined the athlete experience as it relates to how mobility influences ties to home, how transnational relationships have been constructed and negotiated, and extent of impact on the athlete and his or her home community. The purpose of this study is to examine Kenyan runners' lived experiences and connections with their home communities, specifically focusing on Kenyan athletes training in the United States. The entirety of the Kenyan running phenomenon involves three small towns in the Rift Valley—Iten, Eldoret, and Kapsabet. Those who decide to become athletes move from their home seeking to join a training camp, acquire a manager, and make money racing internationally. Throughout this process athletes and their communities exchange remittances and support, and negotiate identity. Data collection methods will include qualitative surveys, interviews, and utilization of GIS mapping techniques. Data analysis will involve triangulation of data derived from interviews and qualitative surveys. The insights from this research will contribute to the literature on athlete migration, broaden understanding of the East African running phenomenon, and generate new ways to build theory using anthropological lenses.

Nano Formulation of Platin-A and Associated Inflammation

Samuel Kennedy, CURO Research Assistant
Dr. Shanta Dhar, Chemistry, Franklin College of Arts & Sciences

Prostate cancer is the most common cancer found in the male population in the United States. In the late stages, metastasis and chemo-resistance induces tumor recurrence, and that significantly affects the morbidity and mortality of a huge group of prostate cancer patients. Moreover, chronic inflammation associated with tumor tissues plays a key role in the metastasis of prostate cancer. In our continuing efforts to provide therapeutic options for metastatic prostate cancer, we recently constructed a Pt(IV) prodrug, Platin-A, with the ability to release cisplatin, a widely used chemotherapeutic, and aspirin, an anti-inflammatory agent. However, clinical translation of small-molecule based therapeutics requires a suitable delivery system to achieve pharmacokinetics parameters and appropriate biodistribution. Activation of various proteins causes mitochondrial dysfunction, resulting in mitochondrial reactive oxygen species production and downstream signaling that promote inflammation-associated cancer. Using a mitochondria-targeted polymeric-nanoparticle as a delivery vehicle, we anticipated that Platin-A could be rerouted to the mitochondria of cancer cells and attack the mitochondrial DNA, thereby designing a targeted pathway for the well-established drug cisplatin. Platin-A exhibited anticancer and anti-inflammatory properties which were better than a combination of cisplatin and aspirin. This result highlights the advantages of co-delivering an anti-inflammatory agent

with a chemotherapeutic agent in a single prodrug. The enormous potential of Platin-A encouraged the design of additional Pt(IV) prodrugs to co-deliver cisplatin and aspirin. A promising design will be discussed here.

O-Linked Glycosylation Patterns at the Interface of Cervical Mucins and HIV Infection

Hammad Khalid, Foundation Fellow, CURO Research Assistant
Dr. Michael Tiemeyer, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Mucosal surfaces, well known for their role in sensing their environment (nose, mouth), nutrient absorption (gut), gas exchange (lungs), and reproduction (vagina and uterus), also function as a complex immunological barrier at these common sites of entry for pathogens and viruses. However, surprisingly little is known about the complex post-translational modifications of the mucin proteins expressed at these surfaces and about how these modifications provide protection. This project focuses on an in-depth characterization and comparison of the glycans found on cervical mucins from HIV and non-HIV patients aimed at identifying unique modifications that may play a role in mucosal immunity. Samples were collected and prepared to analyze by direct injection nanospray ionization mass spectrometry (NSI-MS). Glycan structures were probed using collision induced disassociation (CID) and assigned using software developed in-house for high-throughput analysis. Preliminary data suggest an increase in sialylated and fucosylated structures in HIV patients, indicating a possible defect in terminal processing of glycans. Interestingly, preliminary data from lectin blots indicate an increase in the abundance of anti-inflammatory mucins in non-HIV patients. The analysis of more patient samples is ongoing. By understanding the fine structural features of the mucosal interface, new approaches for eliciting mucus-tethering antibodies can be considered. Additionally, this research has the potential to develop a more efficient, standardized platform for evaluating the mucus barrier, which could enhance future research on natural and vaccine-induced defenses against other sexually transmitted infections.

The Impact of Sugar during Larval Development on Growth Rate, Energy Stores, and Behavior

Maha Khan, CURO Research Assistant
Dr. Patricia Moore, Entomology, College of Agricultural & Environmental Sciences

The recent invasive pest species, *Drosophila suzukii*, differs from other drosophilids in that its larvae develop in ripening fruit, which is low in protein compared to the rotting fruit and its associated microbes utilized by other drosophilids such as the well-studied *D. melanogaster*. However, ripening fruit may also differ in terms of sugars and thus we are interested in examining how sugar amount and composition of the larval diet affects performance. My previous work on the effects of varying types and amounts of sugars on the development time, survival rate, and body size of the *D. suzukii* demonstrated that *D. suzukii* growth is optimum with moderate to high levels of sugars. However, the type of sugar is also important. I found that a high level of fructose not balanced by high glucose is lethal for *D. suzukii* larvae. My current research project extends these findings by examining development, fat storage, and behavior of both *D. suzukii* and *D. melanogaster* under varying carbohydrate diets. I will first examine development and fat stores upon adult emergence of *D. suzukii* and *D. melanogaster* under four different sugar treatments: fructose, glucose, sucrose, and high fructose corn sugar. I will also undertake a larval choice experiment to determine if larvae are able to adaptively choose the diet

that optimizes development and fat stores. Results from this experiment will help us to understand the nutritional ecology of *D. suzukii* and the role larval diet, particularly related to its unique host, plays in the biology of this invasive pest species.

Alleviating Inequities in Georgia's Public School Funding

Christine Kil
Dr. Jack Parish, Lifelong Education, Administration & Policy, College of Education

Although education is primarily the responsibility of state governments, states entrust a significant portion of education funding responsibility to local governments, who derive revenue for education primarily from property and sales taxes. This shared responsibility of education funding perpetuates a disparity, as raising local revenue and funding varies widely between districts. Any immediate and impacting solution to inequitable funding systems in US states will require full funding of the states' existing education funding formulas. Providing more state funds for education can come from increasing tax revenue or reform of other state social services to provide more money for education. This paper critically examines the impacts of the existing status quo of public school funding in Georgia and proposes three policy alternatives. I consulted primary sources of Georgia's education funding mechanism and spoke with education experts on the current state of public school finance and recommendations for creating a more equitable system. For Georgia specifically, a student-based budgeting (SBB) formula is a transparent alternative to the current Quality Basic Education (QBE) formula that will ensure greater equity in funding students. Traditional funding methods such as the QBE formula allocate funds based primarily on staff positions of different program segments; SBB allocates money based on student characteristics, such as socioeconomic status, limited English proficiency, and disability. Supplements to local revenue, robust funding, and transparent funding formulas will help ensure that investments in education pay back the community and break the cycle of low tax revenues and persistent income inequality.

Identifying Virulence Genes Associated with Emergent *Avibacterium paragallinarum* Isolates Associated with Acute Endocarditis in Chickens Using a Bioinformatic Approach

Christian Kim
Dr. John Maurer, Population Health, College of Veterinary Medicine

Avibacterium paragallinarum is a Gram-negative bacterium known to be the primary etiological agent of infectious coryza, an upper respiratory tract infection with significant detrimental effects on the poultry industry. However, *A. paragallinarum* strains have recently been isolated that instead cause endocarditis in affected birds. In order to characterize the unique pathogenicity of these strains, a bioinformatic approach using a variety of common web-based tools such as RAST and NCBI BLAST was utilized to analyze the genomes of the strains in question, primarily focusing on the identification of potential virulence factors. Once isolated, these factors were compared to those possessed by *A. paragallinarum* reference strains, as well as those of closely related bacterial species, in order to better comprehend the pathogenicity of the endocarditis-causing strains. In our analysis of the genomes of the *A. paragallinarum* strains, several virulence factors characteristic of *A. paragallinarum* were identified, including a three-region capsule locus and a three-gene cytolethal-distending toxin operon. A Type VI secretion system unique to the endocarditis-causing strains was also discovered. In addition, genes coding for RTX toxin, which

is believed to play a major role in *A. paragallinarum* virulence, were found to be absent in the genomes of the endocarditis-causing strains. Further identification and analysis of potential virulence factors will be performed in order to obtain a more complete understanding of *A. paragallinarum* pathogenicity.

A Synthetic Lethal Mutant Screen in *Salmonella* Typhimurium to Identify Genes whose Products Cooperate with RNA Ligase, RtcB, in RNA Repair

Justin Kimsey
Dr. Anna Karls, Microbiology, Franklin College of Arts & Sciences

Many stress conditions are known to damage nucleic acid. The pathways for DNA repair are well characterized in bacteria, but no RNA repair pathways have been defined. In *Salmonella* Typhimurium, a sigma 54-dependent operon, *rsr-rtcBA*, encodes proteins that are homologues of known RNA repair enzymes from metazoans and archaea. RtcB is an RNA ligase that seals broken RNA molecules containing 2'3'-cyclic phosphate and 5'-OH ends, and RtcA converts 3'-P to 2'3'cyclic phosphate. The physiological role of these RNA repair proteins in bacteria is not known. The goal of this project is to use a synthetic lethal mutant screen in *Salmonella* to identify genes encoding proteins/RNA that cooperate with RtcB in RNA repair. A strain with *rtcB* deleted has been transformed with an unstable plasmid that has *rtcB* transcriptionally fused with *lacZ* under the control of the *lac* promoter, and will be mutagenized with a transposable element. To screen for mutants that require the maintenance of *rtcB* for viability, the transposon-mutant library will be grown on LB agar plates in the presence of mitomycin C (MMC), which induces the RNA repair operon, and X-Gal IPTG, which indicates expression of *rtcB-lacZ*. The current focus of the project is to define the concentration of MMC to be used in the selection agar that provides enough stress to induce the operon, as measured by qRT-PCR, and affect cell growth in the absence of RNA repair, as measured by viable cell counts. Transposon insertions in synthetic lethal mutants will be mapped by arbitrary primed PCR.

Inefficiencies of Water Use in Animal Agriculture

Catherine Klein, CURO Research Assistant
Dr. Jeffrey Mullen, Agricultural & Applied Economics, College of Agricultural & Environmental Sciences

In 1977, the United Nations Water Conference resolved that access to fresh drinking water to meet basic needs is a fundamental human right. Since that time, population growth, economic development, and environmental degradation have put increasing pressure on our water resources, raising demand and shrinking supply. In effect, fresh water is an increasingly scarce resource. This scarcity has and will continue to vary around the world depending on environmental factors (eg., precipitation and evapotranspiration rates) and economic factors (eg., income levels and prices), as reflected by the spatial variation in water scarcity indices. A major concern for the future is the dietary shift away from plant-based proteins toward animal-based proteins that often accompanies increases in household incomes. This research study focuses on the cascading effects of rising incomes on the demand for animal-based protein – meat, dairy, and eggs – and the implications for water scarcity. Using country-specific estimates of the income elasticity of demand for meat, dairy, and eggs, and projections of income growth, projected changes in water use for animal agricultural production are developed on a nationwide scale. The effect of projected changes in water demand on a country's water scarcity index are then examined. In addition, expected water quality

impacts of expanding animal agriculture are identified. The study concludes with a discussion of a variety of policy options for mitigating the water scarcity and water quality effects of expanding animal agricultural production.

Oklahoma!: The Building of the Dream Ballet in Two Different Mediums

Hannah Klevesahl
Dr. Marla Carlson, Theatre & Film Studies, Franklin College of Arts & Sciences

In 1943, Richard Rodgers and Oscar Hammerstein II wrote a musical that opened on Broadway and stayed in continuous production in the USA for the next 16 years. This musical was called *Oklahoma!*, and today it remains a staple of many international theatre companies, as well as an example of the first modern musical. It is for this reason that I choose to focus on two specific versions of *Oklahoma!*. The first production I will be examining is the 1955 film, and the second version is the filmed stage production of the 1998 London revival by the National Theatre. The 1998 London revival of *Oklahoma!* as well as the 1955 film both include dream ballets that take place in an alternate dream world, but their methods of building and maintaining those worlds differ. The London revival relies heavily on its ensemble to create the dream, and maintain it, during the fight with Curly and Jud. Since that version is a filmed copy of a live performance, it makes sense that the stage production would utilize their ensemble in order to establish the convention of a dream world. In contrast, the film uses special visual effects for its dream sequence and fight. These effects are utilized to show the audience that the dream sequence does, in fact, take place in a dream. Both productions' methods achieve their goal of establishing the convention of a dream world, but are altered slightly to fit their medium.

Size Labeling for Infant Clothing: Cultural Perspectives on Childhood Growth

Allison Koch, Foundation Fellow, CURO Research Assistant
Dr. Susan Tanner, Anthropology, Franklin College of Arts & Sciences

Previous research has suggested that childhood nutrition and growth patterns are strongly associated with current and future health outcomes, but little is known about how parents understand and evaluate the size and growth of their children. A literature review found that pediatric growth charts are not widely understood or implemented by parents. Instead, research suggests that parents use characteristics of their child and sociocultural norms about appropriate size to evaluate growth. This study explores if clothing size is an additional way through which parents evaluate the size and growth of their infants. Because Latino populations in the U.S. are more than twice as likely as the average consumer to purchase clothing in the birth-to-preschool market, this research will focus on Latino parents in Southeast Georgia. Semi-structured interviews will determine what growth assessment mechanisms, including clothing sizes, are most useful and important to parents. The qualitative and quantitative data will be evaluated to assess *to what extent* Latino parents use clothing size labels to assess the growth of their infants. It is expected that clothing labels are frequently used by parents in gauging infant growth, but parents may not be overly concerned if they must purchase clothing outside of their child's age or weight designation. This research has implications for understanding how the social environment could shape parents' understanding and evaluation of child growth and health.

Abstracts

Clearing Natural Forest Lowers Decomposition Rates and Results in Less Diverse Macrofauna and Mesofauna Communities

Allison Koch, Foundation Fellow, CURO Research Assistant
Dr. Scott Connelly, Odum School of Ecology

Global climate change and increasing demands on world resources continue to lead to concomitant transformations of land use and the widespread loss of biodiversity. These global factors may be threatening local ecosystem functions—the various ways in which biotic and abiotic components interact to maintain the health of the system. This study explored the effects of anthropogenic change on the essential process of decomposition. Mesh leaf litter bags were placed at two sites near San Luis, Costa Rica: in natural forest and in an area that had been converted to pasture. Some mesh bags were filled with homogenous leaf clusters, which contained the plant taxa *Cecropia*, *Rubiaceae*, or *Solanaceae*. Others were categorized as heterogeneous and contained all three plant taxa mixed. This was done to simulate diversity loss. Bags were collected at four intervals over 37 days, re-weighed, and emptied of decomposers—the macrofauna and mesofauna community—for further analysis. Leaves in the forest decomposed faster than their counterparts in the open pasture, and on all collection days, leaves placed in the forest hosted a more diverse fauna community than leaves placed in the pasture. Heterogeneous leaf groups did not show significantly greater levels of fauna diversity than homogenous leaf groups, suggesting that biodiversity loss may not affect decomposition. Clearing the natural forest, however, does impact ecosystem function by leading to slower decomposition rates and less diverse macrofauna and mesofauna communities.

Child Neglect, Depressive Symptoms, and Substance Use among Children and Adolescents Reported to Child Protective Services

Stephanie Kors, CURO Research Assistant
Dr. Assaf Oshri, Child & Family Development, College of Family & Consumer Sciences

Children who have experienced parental neglect are at significant risk for the development of depressive symptoms and substance use behaviors in adolescence. Using the self-medication hypothesis, we aim to test whether increased adolescent drug abuse is a result of a maladaptive coping strategy neglected youth use in an effort to reduce stress-associated with depressive symptoms. In addition, gender differences in this hypothesis were examined. A longitudinal sample of 796 children from the National Survey of Child and Adolescent Well-Being was examined at three time points (aged 11-13 at wave 1, 12-15 at wave 2, and 14-16 at wave 3). Structural equation modeling was used to test a mediation model in which child neglect is associated with adolescent substance use through increased levels of depressive symptoms. Statistical model fit was satisfactory ($\chi 2$ (20) = 75.55, p = .01 CFI =.91; RMSEA = .03; SRMR = .05). Multiple group analyses revealed significant moderation by gender. For males, supervision neglect at time 1 significantly predicted depressive symptoms at time 2 (β = .22; p < .05) and depressive symptoms at time 2 significantly predicted cannabis use at time 3 (β = .26; p < .05). Mediation analyses confirmed an indirect effect from supervision neglect to increased substance use via depressive symptoms among males (β = .08; p < .01). These results suggest the need for interventions for neglected children via preventive programs that address depressive symptomatology during early adolescence in order to modify risk for subsequent

involvement in substance use behaviors during adolescence.

Studying the Kinetics of N-glycan Release by PNGase F with MRM Quantitation of the Glycopeptides from Human Serum Glycoproteins

Adam Kramer
Dr. Ron Orlando, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Peptide-N-Glycosidase F, PNGase F, is an endoglycosidase that cleaves the linkage between the asparagines residue and innermost GlcNAc of N-linked glycans. Because this enzyme releases all mammalian N-linked glycans, it is widely used in the analysis of glycoproteins. While performing glycomic studies, we determined that the PNGase F release introduces the largest source of quantitative variation, which led us to conduct a more detailed study of this enzyme system. Here we investigated the kinetics of glycan release, to determine the effect of glycan structure and amino acid sequence on the rate of glycan release as this would be a reasonable explanation for the observed quantitative variations. Human serum was subjected to a standard trypsin digestion protocol, followed by PNGase F digestions. Aliquots of the digestion mixture were taken at various time points and were analyzed by LC-MS using a Penta-HILIC column on Shimadzu Nexera LC system interfaced to a Q-trap 4000 MS analyzer (ABSciex). Selected reaction monitoring methods were utilized to quantitate every known glycoform of each tryptic peptide from the major serum glycoproteins, for example 20 glycoforms for each of the human serum IgG subclasses (i.e., IgG1, IgG2/3, and IgG4). We have utilized this method to determine the changes of glycopeptide residues after various PNGase F digestion times. We are currently developing SRM methods to investigate the glycoforms of the other major serum glycoproteins to determine if larger changes in the amino acid sequence flanking the glycosylation site alter the rate of glycan release.

The Potential Protective Effects of Anthocyanins on Liver Insulin Signaling

Madison Krieger
Dr. Claire de La Serre, Foods & Nutrition, College of Family & Consumer Sciences

Obesity is a rising epidemic in the United States, effecting up to one third of its population. Obesity and its comorbidities, such as diabetes and cardiovascular diseases, are associated with low-grade inflammation. Recent work has notably found that inflammation is causally linked with insulin resistance or pre-diabetes, especially affecting liver insulin sensitivity. The use of bioactive foods, namely ones with anti-inflammatory properties, could produce beneficial effects. In this study we examine the potential protective effect of blueberries, a food rich in anti-inflammatory anthocyanins, on insulin sensitivity and liver functions. Rats were fed three different diets for 8 weeks: low-fat(LF), high-fat(HF), and high-fat supplemented with 10% blueberry(HF-BB). The HF and HF-BB diets were matched for fiber and calories while all three were matched for sucrose content and amount of food. After 7 weeks on the diets, animals underwent on oral glucose tolerance test and at the end of the study livers were harvested. Insulin signaling was investigated by western- blotting. H & E staining and Oil-Red O staining were completed and evaluated to determine fat infiltration in the liver. Additionally, immunohistochemistry will be performed using an F4-80 antibody to determine the amount of macrophage presence in the liver, signifying inflammation. The hypothesis is that the rats fed an HF-BB diet will have significantly less macrophage infiltration and fat infiltration than those fed an HF diet. If this is the case, then we can conclude that anthocyanin-enriched diets can reduce the

impacts of inflammation and therefore improve insulin signaling.

Changes in Neural Activation Following Daily Practice of Saccade Tasks

Mitra Kumareswaran
Dr. Jennifer McDowell, Psychology, Franklin College of Arts & Sciences

Cognitive control relies on contextual cues and existing perceptions to enable neural mechanisms to respond to parameters of a cognitive task and produce the appropriate behaviors. The ocular motor system, the neural circuit that guides eye movements, serves as a model of cognitive control with two opposing tasks: prosaccades are directed gazes toward a peripheral cue while antisaccades are gazes toward the mirror image location of the cue. Since antisaccades involve suppressing the instinct to view the stimulus in order to generate a saccade in the opposite direction, they require higher levels of cognitive control and greater neural activation in saccade circuitry than stimulus-driven prosaccades. In the current study, the probability of antisaccades presented within a given trial was varied to observe changes in neural activation in saccade circuitry as a result of context. Thirty-five subjects performed five saccade tasks in the functional MRI environment where the percent of antisaccades to prosaccades was 0%, 25%, 50%, 75%, or 100%. Brain scans were collected at baseline and after four days of saccade practice to compare changes in activation over time. With practice, the subjects were faster, made fewer errors, and decreased neural activation, notably in the cuneus, supplementary eye fields, and prefrontal cortex. Correlations between behavioral measures and brain activation suggest that participants increased task efficiency by utilizing cognitive control cues following practice. A better understanding of the relationship between cognitive control and the ocular motor system can be utilized to detect deviations from normal functioning that may occur in neurological disorders.

Addressing the Lack of Access to Public Assistance for Adults with Autism

Mitra Kumareswaran
Dr. Jay Rojewski, Career & Information Studies, College of Education

Under the status quo, individuals with autism who have an IQ score below 70 and display severe cognitive disabilities are eligible to receive state and federal services such as group homes, job training, and case management upon aging out of the school system. Individuals with autism who have mild to moderate cognitive impairments may also need such services but are very unlikely to receive the services or may not even be eligible to receive the services. Within the past twelve years, the rate of children diagnosed with autism has increased by 228%, and the nation is ill-equipped to take care of the current population of autistic adults let alone the future population of these individuals. To improve upon the status quo, alternativ policies were analyzed based on political feasibility, cost-effectiveness, and equity. The policies evaluated were the status quo, a policy to change the method used to determine service eligibility and provision, a policy to allow autistic students to attend public school until age 25 instead of age 21, and a policy to pass a federal autism health insurance mandate. Of the four policies, the policy that entailed providing needed services based on the needs and cognitive impairments of the adult with autism was the most effective to implement. To implement the selected policy, Congress and state governments must pass legislation to change how adults with autism are provided public assistance and additional funding must be allocated toward providing increased public services to a larger population of beneficiaries with autism.

Abstracts

Speed Effects on Angular Displacement of Back during Gait

Eric Kure, CURO Research Assistant
Dr. Kathy Simpson, Kinesiology, College of Education

According to the American Chiropractic Association, as many as 80% of the population will experience a back problem at some point in their lives. Therefore, understanding the mechanical demands on the back of various physical activities is important. The purpose of this study was to determine which back region (upper, middle, and lower) demonstrates greater angular motions as running speed increases. Twenty healthy, physically active volunteers (age = 22.4 ± 3.0 yr, mass = 67.4 ± 12.9 kg, height = 1.7 ± 0.1 m) ran at 3 different speeds (natural, 110% of natural, and maximum). Reflective markers on the back region were used to capture spinal movements by seven infrared cameras. From ANOVA results, (p <.05), it was determined that the amount of rotation in all regions of the back increased (p<.01), with the exception of the upper back during flexion and extension (p=.26). The lower back twisting motion showed the greatest increased motion at faster speeds, suggesting that lower back tissues may have greater strains placed on them. These findings could be beneficial for individuals with low back problems.

Factors Influencing Gut Microbial Community Structure in Mosquitoes

Kip Lacy
Dr. Michael Strand, Entomology, College of Agricultural & Environmental Sciences

It is well established that microbes are integral to insect biology. Mosquitoes are important insects because many species are vectors which transmit disease-causing pathogens in humans and other vertebrates. Recent studies indicate that mosquitoes host a community of bacteria (microbiota) in their digestive system that influences their development, reproduction, and vector competency. This community is acquired by larvae from their aquatic environment and persists to the adult stage. However, the factors determining community composition and the relative abundance of community members are not well understood. In this study, we examined the influence of the aquatic microbiota on gut community structure and mosquito development using *Aedes aegypti* mosquitoes reared under sterile conditions in a controlled bacterial environment. Our results support a strong role for the aquatic environment in determining mosquito gut community composition and identify specific community members as key factors influencing bacterial abundance and diversity in the gut. These results have important implications for ongoing studies to describe microbial communities in populations of vector mosquito species in the field.

Financial Literacy in College Students

Benjamin Landes
Dr. Brenda Cude, Financial Planning, Housing & Consumer Economics, College of Family & Consumer Sciences

It is commonly conceived that college students have poor financial competency, yet little is known about the severity, cause, or ramifications of this issue. Therefore, the purpose of Dr. Cude's study is to determine how well college students understand financial vocabulary and concepts, where this knowledge or lack thereof derives from, and the impact of this level of knowledge on their debt, financial self-perception, social comparison, delay of gratification, and more. To answer this question, Dr. Cude administered a 30-item pre-test and Likert scales, which previous research has proven to test financial literacy and other items of interest, to 1,000 college seniors in her classes. I then assisted Dr. Cude in importing and analyzing this data through Microsoft Excel and IBM SPSS, creating frequency tables,

regression analyzes, chi squared values, and other relevant statistics. While research is still in progress, we have determined that among Dr. Cude's students, the mean grade on a finance pre-test is a failing 50%, only half own credit cards (while previous research suggests this number is as high as 75%), and only 7% report having financial education in high school. Further research will be done with the ultimate goal being to acquire a greater understanding of college students' financial matters in order to determine the necessary actions to improve students' financial well-being.

Drug Discovery and Structural Studies of an Essential Transcriptional Regulator, ACIAD0746

Paige Lane
Dr. Cory Momany, Pharmaceutical & Biomedical Sciences, College of Pharmacy

The LysR-type transcriptional regulator ACIAD746 is an essential regulator in *Acinetobacter baylyi* that is not functionally well-characterized. The goal of this project is to discover compounds that will interact with this protein and to characterize the structural changes associated with the binding of regulatory ligands using X-ray crystallography. Crystals of ACIAD746 protein were prepared from protein incubated with the potential ligands (cysteine, methionine, and sulfite), and the crystals revealed different habits that were analyzed using X-ray diffraction. Several atomic structures with cysteine were obtained, but the bound ligand was not identified and the results appear inconclusive. Similar studies with sulfite are in progress. The purpose of this research is to understand whether bound ligands to ACIAD746 will alter the DNA conformation of the protein and consequently alter transcription. The essentiality of this protein suggests that it is a potential drug target. Studies are in progress to identify small molecules from natural plant extracts that may prevent the activation process where the protein recruits RNA polymerase to the promoter of genes controlled by the protein. Such small molecules would represent a new class of antibiotics. Because ACIAD746 has homologs in numerous pathogenic bacteria, compounds identified in these studies could have broad spectrum activities as therapeutics.

Syrian Civil War Victims Receiving Medical Care in Israel: Humanity in a War Torn Region

Sarah Lane
Dr. Richard Schuster, Health Policy & Management, College of Public Health

The Syrian Civil War began in the spring of 2011, and the availability of healthcare in the country has been declining rapidly ever since. Due to the lack of healthcare and general stability, more than 1.5 million Syrians have fled to refugee camps in nearby countries. Although Syria shares a border with Israel, civil war victims aren't able to seek refugee status in Israel due to a policy that refuses asylum to "subjects of enemy or hostile states." However, this has not kept Israel from providing medical care to injured Syrians. Since March of 2013, Syrians with traumatic war injuries who are found near the Syrian-Israeli border are brought into the country by the Israel Defense Forces and taken to various hospitals in the Galilee region. This study examines the demographics, diagnoses, procedures, and resource utilization of Syrian patients that have been admitted through the emergency department to the Galilee Medical Center, a large general hospital in Nahariya, Israel. These findings were then compared to a random sample of Israeli trauma cases. We found that the Syrian patients were younger and more predominately male than Israeli trauma patients, and they had longer lengths of stay, underwent more procedures, and had a higher mortality rate. As a result, the Syrians'

medical bills were on average 350% more than Israeli patients'. These findings can be used to help Israeli hospitals prepare both clinically and financially for Syrian Civil War victims who will continue to be brought into the country with traumatic injuries.

Identification of the Mechanism for Ciliary Gliding in Heterotrophic Euglenids

Jeffery Lanier, CURO Research Assistant
Dr. Mark Farmer, Biological Sciences, Franklin College of Arts & Sciences

In this study, the gliding motility of unicellular eukaryotic organisms was studied to determine the mechanism by which the organisms attach themselves to a substrate and propel themselves along it. Despite its widespread occurrence among protists, ciliary gliding is the least well-characterized form of flagellar-associated cell motility. The euglenid flagellate *Paranema trichophorum* is an ideal study organism due to the fact that gliding is its primary form of locomotion. Lectins are plant-derived carbohydrate-binding proteins, usually with preferred sugar specificities. By utilizing lectins and observing their effect on cell velocity, we can identify possible sugars present on ciliary membranes that may facilitate substrate adherence and gliding motility. If lectins attach to sugars of the flagellar hairs that extend from the cilium and thus interfere with gliding, the velocity of lectin-treated cells should decrease. Observing cell velocity without lectins provides a control. After incubating *Peranema* with increasing concentrations of the lectin Concanavalin A, the lectin-treated cells showed significantly decreased gliding velocity. Fluorescently tagged lectins were observed with confocal microscopy to confirm the lectin binding to the ciliary surface. Our study suggests that flagellar hairs play a role in ciliary gliding, and expanding upon this research may finally reveal the mechanism of ciliary gliding.

Worried, Concerned, and Untroubled: Patterns of Adolescent Worry

Rebecca Lanier
Dr. Jay Mancini, Child & Family Development, College of Family & Consumer Sciences

During adolescence, many situational and cognitive changes occur that enable youth to anticipate and conceptualize future events and outcomes, which may increase susceptibility to worry development and maintenance. Although the majority of adolescents seem to worry infrequently, or only have typical adolescent worries, roughly 25% experience frequent worry. Worry becomes particularly problematic when it co-occurs with other internalizing/externalizing symptoms, such as low self-efficacy and delinquent behaviors. This suggests a need to study adolescent worry and differentiate the levels of worry youth experience. Our research is expected to indicate youth groupings by differing levels and topics of worry. We hypothesize that specific individual, environmental context, and relational characteristics will create distinct groupings of worry and that group designation is associated with other well-being aspects. We investigated worry patterns among an adolescent sample using a latent profile analysis (n=273). Youth responded to eight items from the Generalized Anxiety Subscale of the Revised Version of the Screen for Child Anxiety Related Emotional Disorders (SCARED-R; Muris et al., 1999), which created profiles describing the intensity and focus of adolescents' worry. The results indicated the existence of three distinct groups varying in intensity, probable causation, probable association, and worry topics. Three groups were identified: *worried* (23.8%), *concerned* (37.7%), and *untroubled* (38.5%), respectively. *Worried* youth were comparatively more nervous, more worried about the future, and more worried about previous occurrences; *concerned* youth reported moderate levels of worry about personal

ability and about others liking them; *untroubled* youth reported relatively little concern about typical sources of adolescent worry.

Storytelling for Social Justice: Fostering Activism through Collective Memory Work

Jose Leandro, CURO Research Assistant
Dr. Corey Johnson, Lifelong Education, Administration & Policy, College of Education

Storytelling has been central to social justice movements, with stories becoming a method of potential and actual transformation of oppression and injustice. With the acknowledgement of the need for advocacy for the LGBTQ community in bridging the gaps in equality, self-identified LGBTQ activists will be introduced to Collective Memory Work. This study intends to introduce Collective Memory Work to investigate and answer the questions: 1) what motivates LGBTQ activists to resist internalizing anti-LGBTQ oppression? and 2) how do memories keep activists engaged and energized to do the work of social justice? Collective memory work encourages participants to recall, examine, and analyze earlier memories and experiences in a broader cultural context to see how individual experiences link to collective, shared experiences of similar and/or different groups in society (Haug, 1992). Two focus groups will be conducted with each involving 4-8 participants. The researchers anticipate that participants will increase their knowledge about leisure, LGBTQ activism, self-identity, culture, the diversity among fellow participants, and the influence that they have on others as activists. By engaging in collective memory work, participants will also learn about a new tool for building a sense of understanding, unity, and collectivism in moving their causes forward and in sustaining activism for a more socially just society.

Change the Channel: Can Firms Influence Consumer Channel Choice through Marketing Contacts?

Lyndon Lee, CURO Research Assistant
Dr. Sue Chang, Marketing, Terry College of Business

With the recent proliferation of various channels, such as the Internet, many companies have adopted a multichannel strategy. Today, consumers can purchase a product through more than one channel and will often switch channels based on their channel preference at a specific time. Consumers' fluidity between channels makes it difficult for a firm to determine which channel a consumer prefers at a certain moment and how to contact its individual customers most effectively. Emails and catalogs, currently two of the most common methods of contacting consumers, may increase brand awareness and purchase intention. However, depending on marketing contact strategy (e.g. method used (catalog versus email), frequency of contact), the marketing contacts may result in different purchase and channel choice decisions of consumers. While previous research exists studying various relationships between the channels in a multichannel environment, few papers separate the effects of discrete marketing contact methods (e.g. email versus catalog). Using a dataset from an undisclosed retailer, we built a model to analyze the different impacts of email contacts and catalog contacts on the performance of each channel in a multichannel environment. We also examine other critical factors influencing the channel decisions of consumers such as the convenience of product return and the consumer's distance from a physical store.

The Impact of Foreign Aid on Democracy in Africa

Benjamin Leigh
Dr. Laura Zimmermann, International Affairs, School of Public & International Affairs

This paper seeks to address the impact of foreign aid on the democratization of recipient countries in the African context. There is some evidence in the academic literature that governments are less responsive to the people, and the people care less about government actions, when government income comes from sources other than direct taxation. With most foreign aid tied to the goal of promoting democracy, there are serious implications for policy if foreign aid reduces the likelihood of a recipient country democratizing. Using a variety of sources on foreign aid receipts and democracy scores over time for different countries, this paper seeks to analyze the impact of foreign aid on democracy. The paper begins with a review of literature, followed by a discussion of the relevant questions. Methods are discussed and followed by data, which is then interpreted. A conclusion follows to tie all parts of the paper together.

Design of a 1,5-Substituted Triazolyl-Bridged Peptide to Inhibit EGFR Activation

Peter Liaw, CURO Research Assistant
Dr. Eileen Kennedy, Pharmaceutical & Biomedical Sciences, College of Pharmacy

The Epidermal Growth Factor Receptor (EGFR) signaling is tightly controlled and involved in many cell activities such as growth, differentiation, and migration; however, overexpression of EGFR has been linked to many carcinomas such as breast, prostate, and colorectal. A significant step in the activation of EGFR involves a region termed the "dimerization arm" within domain II. Dimerization arm interactions between two EGFR monomers lead to trans-autophosphorylation of the intracellular domains and subsequent downstream signaling events. Our lab aims to inhibit EGFR by disrupting important protein-protein interactions for receptor activation. In this project, I have synthesized a dimerization arm mimic using 1,4- and 1,5-substituted 1,2,3-triazolyl bridges to lock the peptide into a beta-loop conformation. A medicinal chemistry approach will be used to compare the 1,5-substituted peptide with the 1,4-substituted peptide. The peptides were synthesized using conventional Fmoc solid phase peptide synthesis with a ruthenium-catalyzed azide-alkyne cycloaddition to form the triazolyl-bridge. Two ruthenium catalysts were tested under different reaction conditions. The structure of the peptide will be characterized and cellular activity will be tested. This research offers a medicinal chemistry approach to inhibit EGFR by synthetically blocking the dimerization interface. Furthermore, this approach can be applied towards other peptide-peptide interactions, especially ones that utilize a beta-loop conformation.

How Did Female Candidates Fare in the 2014 Election?

Alexandra Lilly
Dr. Charles Bullock, Political Science, School of Public & International Affairs

Females are still vastly underrepresented in governments around the world, and specifically in the United States. While women make up about 50% of the population, they make up 19.4% of our national legislature. This paper researches how successful women were in gaining seats in both the House of Representatives and Senate in the 2014 midterm elections and which factors affected their success. I will be comparing the data from the most recent election to traditional national trends pertaining to the success of women in these elections. A variety of factors will be analyzed. First, I will identify the percentage of women elected to each house of Congress, which parties elected them, and their success in primaries as well as in runoffs. I will also further study the freshman female legislators: how many there were and which factors

contributed to their success. Next, I will find where women obtained funding for their campaigns. Lastly, I will examine trends in the original careers of female legislators. This information can all be found in online databases. The midterm election is significant, as it is the last national election before a major Presidential election year. This election is unique because traditionally, more women are elected from the Democratic Party, but with the strong Republican climate in the nation, more female Republicans found success in the 2014 midterms. There are 100 women for the first time ever, and this data can give a clearer insight of the factors contributing to this trend.

Disruption of Signaling at Oocyte MTOCs Leads to Meiotic Division Errors and Embryonic Loss

Mallory Little, CURO Graduation Distinction
Dr. Maria Viveiros, Physiology & Pharmacology, College of Veterinary Medicine

Aneuploidy (an abnormal chromosome number) in oocytes before fertilization can lead to pregnancy loss and birth defects such as Down syndrome. Aneuploidy can result from meiotic chromosome segregation errors owing to spindle defects and inaccurate chromosome-microtubule attachments. Potential underlying causes of spindle defects include disrupted microtubule-organizing center (MTOC) associated proteins. This study tested the function of a key MTOC-associated protein, pericentrin. Using a unique transgenic RNAi oocyte-conditional knockdown mouse model, we tested the impact of pericentrin loss on meiotic division and female fertility. Q-PCR confirmed lack of *Pcnt* transcripts in oocytes from transgenic females, and fertility was determined by mating with control males for 6 months. Moreover, metaphase-II oocytes were collected to evaluate spindle and chromatin configurations by immunofluorescence. The mean number (± SE) of viable pups/litter was significantly lower in transgenic females (4.89 ± 0.78 *vs.* 11.62 ± 0.93), and timed mating analysis on day16 (E16) of gestation revealed that embryonic loss occurs post-implantation in utero. Immunofluorescence confirmed pericentrin expression at MTOCs in oocytes from control, but not transgenic, females. The *Pcnt*-depleted oocytes showed increased spindle disruption and chromosome misalignment as well as a higher incidence (18.8 ± 4.6 *vs* 8.3 ± 2.7) of attachment errors, as indicated by chromosome lagging. These defects potentially contribute to chromosome segregation errors that lead to aneuploidy. This study confirms effective depletion of pericentrin in oocytes from *Pcnt* RNAi transgenic female mice. Notably, pericentrin loss in oocytes is associated with increased meiotic errors and significant embryonic loss. Funding: NIH (HD 0713330)

Electronic and Photonic Modeling of GaN/InGaN Multiple Quantum Well Light Emitting Diodes

Bhaskar Lokanathan, CURO Research Assistant
Dr. Lawrence Hornak, College of Engineering

LEDs (Light Emitting Diodes) play a vital role in most optoelectronic devices, and recently there has been great interest in the development of efficient Group III Nitride Light Emitting Diodes, as they allow a wide range of wavelengths. Much research has gone into quantum wells, as they increase efficiency and allow tuning in emission wavelength. The time and cost of fabricating these devices hinders further research in optimization of these devices, so Technology Computer Aided Design (TCAD) simulation tools have been crucial in aiding engineers in the early design phase. These tools may be used to model the materials, device physics, and quantum effects of multiple quantum well LEDs. In this research project, TiberCAD and Optiwave FDTD will be used to design

and analyze device components of multiple quantum well (MQW) LEDs. The effects of electronic and photonic device characteristics including: variations of mole fraction and well width on MQW energy levels and optical emission wavelength, impact of device layout on light extraction, and current-voltage (I-V) characteristics will be examined. The results will be compared to fully grown and fabricated GaN/InGaN MQW LEDs in order to optimize their performance.

The Presentation of Victimhood and Virtue in the Holocaust-Focused Works of George Tabori

Kelsey Lowrey, Foundation Fellow
Dr. Martin Kagel, Germanic & Slavic Studies, Franklin College of Arts & Sciences

I studied the works of the Hungarian-German Jewish playwright George Tabori and their relationship to the late feminist concept of oppression as a social position, specifically through the lens of the Holocaust, as well as their value as works for confronting and making sense of loss under the Nazi regime and continuing injustices in the world today. To do this I compared two of Tabori's best-known works with a play by his contemporary and known inspiration Bertolt Brecht, whose unique style of critiquing oppression is already well-studied. I also applied theories from second-wave feminist essays to Tabori's works and to his literary portrayal of victimhood. I ultimately found Tabori's works to propagate an oppressive idea of victimhood and virtue being necessarily indistinguishable, with strongly misogynistic undertones, making his works at best useful for coping with the realities of the Holocaust in the late 20th-century Germany for which he wrote them, and at worst not useful and potentially harmful to apply to instances of oppression in the modern world. Tabori is a celebrated author in Germany and his works hold great cultural significance there, but few critiques of the modern social implications of his writing have been made – critiques which are necessary when dealing with works that influence national opinion over topics as significant as the Holocaust and the social position of the victim.

Use of a Breath-Hold Paradigm to Remove FMRI Variability due to Vascular Factors in Older Adults

Joshua Lukemire, CURO Summer Fellow
Dr. Lawrence Sweet, Psychology, Franklin College of Arts & Sciences

Functional Magnetic Resonance Imaging (FMRI) is one of the principle methods used to investigate cognition. FMRI analyses are based on the blood-oxygen-level-dependent (BOLD) signal, which depends on blood flow and volume and is considered a proxy for neural activity. For inference based on FMRI to be reliable, it is important that BOLD differences between subjects be due to neural activity and not physiological factors. If a condition such as cardiovascular disease causes participants to have compromised neurovasculature, their BOLD responses could show systematic differences from healthy adults. Methods correcting for differences in neurovasculature are needed to overcome this. One such method is breath-hold scaling, which uses a breath-hold task to elicit a robust increase in blood flow. Due to the cognitive ease of the task, most of the BOLD change induced should reflect physiology. The response to another task is scaled using the response from the breath-hold task, and the resulting data is less confounded by physiological differences. In this study we investigate the effects of breath-hold scaling in 18 older adults. We scaled the response to a working memory task and examined regions of interest (ROIs) in 15 task-related areas, as well as 3 control areas. All but 2 of the task-related ROIs showed a significant reduction after scaling; however, no significant changes were observed in the control ROIs. These findings suggest that

scaling is having the intended effect of producing a signal that more accurately represents the neural component of the BOLD response by removing physiological confounds.

Type of Infant Feeding, Weight, and Body Composition Changes in Early Infancy

Joy Maduka
Dr. Alex Kojo Anderson, Foods & Nutrition, College of Family & Consumer Sciences

Childhood obesity and rapid weight gain has been linked to feeding practices during the formative stages of life. The purpose of this study is to examine the influence of types of infant feeding (breastfeeding, mixed feeding, and formula) on infant weight gain and body composition changes in early infancy. This is part of a pilot study that enrolled pregnant women and followed them through 16 weeks postpartum. Infants born at full-term and normal birth weight were scheduled for weight and body composition measurements via the PEA POD at 2, 8, and 16 weeks postpartum. Mothers were required to keep a bi-weekly 24-hour feeding log. At birth, breastfed newborns weighed slightly higher than formula fed infants (3.64 kg vs 3.04 kg, $p=0.029$) and the rate of weight gain was slower among breastfed compared to formula fed infants, although not statistically significant ($p>0.05$). There was a statistically significant difference in percent body fat (adiposity) between breastfed and formula fed infants at 8 weeks postpartum (19.36% vs 12.98%, $p=0.03$) but not at 2 weeks (13.27% vs 12.60%, $p=0.10$) and 16 weeks (22.56% vs 16.63%, $p=0.14$) postpartum. Our preliminary results show that the rate of change in adiposity is faster for breastfed infants compared to formula fed infants, though not statistically significant. Initial observation suggests that early infant body composition is associated with infant feeding type. A further examination of the influence of feeding mode is likely to improve our understanding of the differences in changes in adiposity between breastfed and formula fed infants.

Mammary Gland Specific Deletion of Rac1 on MMTV-PyVT

Eric Malaney, CURO Research Assistant
Dr. Tamas Nagy, Pathology, College of Veterinary Medicine

Rho family G proteins have been found to be integral for regulation of a myriad of functions in the cell. One such function is a role in gene expression. Through lamellipodia extension, the regulation of Rac protein of the Rho family GTPases allows these proteins to be found in the body in both active and inactive states; in the GTP-bound state, these GTPases are active, and in a GDP-bound state, they are inactive. Initially, Rac1 was identified as an essential player in β1-integrin signaling in cultured mammary epithelial cells. More recently, Rac1 was found to be indispensable for prolactin signaling during secretory maturation of the mammary epithelium. Overexpressing Rac1 has been found to promote tumor development of the mammary gland in mice. Our current work in the laboratory focuses on further delineating the precise role of Rac1 in mammary carcinogenesis using mutant mice with mammary gland-specific deletion of Rac1 and mammary gland-specific expression of the polyoma middle T antigen (PyVT), a known oncogene. We found that mice having both PyVT expression and Rac1 deletion in the mammary epithelium develop mammary tumors significantly later than mice that only have PyVT expression in the mammary epithelium. The research was performed by purposefully breeding different mouse lines to generate offspring with desired genotypes, PCR genotyping of offspring, and immunoblotting. The goal of the research is to further characterize the role of Rac1 in mammary carcinogenesis in order to explore possible new avenues in anticancer therapy.

The Relationship between Adverse Child Experiences, Family Needs, and Child Outcomes

Emily Maloney, Foundation Fellow
Dr. Stacey Neuharth-Pritchett, Educational Psychology, College of Education

Children living in poverty are exposed to a number of adverse childhood experiences (ACEs), placing them at-risk for prolonged negative cognitive, emotional, physical, and mental health issues (Sacks, Murphey, & Moore, 2014). Research from neuroscience suggests children living in toxic stress conditions resulting from ACEs demonstrate decreased executive functioning skills – the higher cognitive functions responsible for memory, inhibitory control, and mental flexibility (Center on the Developing Child, 2011). The Head Start program serves as a stabilizing preschool environment for children with ACEs to attenuate these harmful side effects of living in poverty. When applying for Head Start, families supply background information on the number of ACEs in relation to identified family needs. Head Start then theoretically uses the family needs assessment to help the family set attainable goals realized by program exit. The research question for this causal-comparative study was: What is the relationship between number of ACEs, family needs and goals, and child developmental outcomes? Results indicated the number of ACEs experienced by families was statistically and significantly related to needs expressed by parents including employment, finances, mental health resources, parent/child bonding, and education. Children with more ACEs had parents who specified goals consistent with addressing such needs, but not in all cases. Children in families experiencing more ACEs had poorer cognitive development scores at the beginning of the intervention year. This study illuminates the complex relationship between ACEs, family goal setting, and child outcomes in designing intervention for children and families living in poverty.

Reducing Teen Pregnancy: The Case for Comprehensive Sex Education in Georgia

Emily Maloney, Foundation Fellow
Nneka Ewulonu
Mallory Harris, Foundation Fellow
Dr. Stacey Neuharth-Pritchett, Educational Psychology, College of Education

Georgia's current policy on middle school sex education stresses abstinence and focuses on the negative effects of premarital sex, requiring coverage on sex and HIV but not contraceptives or sexual coercion (Georgia Parents for Responsible Health Education). Although abstinence-only education has some short-term effectiveness in pregnancy and disease prevention, this approach has been shown to have little to no impact on future sexual attitudes (Devaney, Fortson, Quay, Wheeler & Clark, 2007). The state of sex education standards in Georgia is significant because of the negative consequences it has for both teenagers and taxpayers. Teenagers clearly suffer physical, social, and economic consequences of inadequate sex education. Costs associated with Georgia's teen birth rate totaled over $395 million in 2010, accounting for 19,029 teen pregnancies (Georgia Campaign for Adolescent Power and Potential). This research is intended to explore implementable comprehensive sex education policy alternatives to the current standards for sexual education in Georgia. The primary method in this research was analyzing the effectiveness of different types of sex education and basing the policy on previous comprehensive programs in other states and countries. Based on our findings, we believe the Georgia Department of Education should revise and improve the Quality Core Curriculum Standards and Resources to require comprehensive sex education and institute a system of 30 certified educators, each teaching sex

education in 16 or 17 geographically clustered schools, covering all 485 Georgia public middle schools.

Perception of Student-Athletes on UGA's Campus

Jillian Maloney, Cara Smith, Mackin D'Amico
Dr. Billy Hawkins, Kinesiology, College of Education

When student-athletes are being recruited, coaches convey the idea that they will be universally admired as student-athletes on campus. In our personal experience, most non-student-athletes perceive student-athletes as arrogant, receiving special treatment, and as being at a lower academic level than the average UGA student. So, are student-athletes admired or detested, and what is the cause of this perception? To measure the true perceptions of student-athletes, we surveyed non-student-athletes, student-athletes, and instructors, asking questions about their experiences with student-athletes and the amount of benefits that student-athletes receive. The implications of this study are that student-athletes may be conditioned, through the recruiting and athlete orientation process, to have an inflated sense of importance on campus, especially revenue-generating student-athletes. We believe that non-student-athletes and even instructors sometimes hold student-athletes in a negative light. Even student-athletes sometimes have negative perceptions of their fellow athletes, finding them more arrogant than the average student. We also explored the difference in observations for revenue-generating student-athletes and non-revenue-generating student-athletes. The student-athletes in revenue-generating sport are subject to the most polarized perceptions and seemed to experience the admiration of non-student-athletes, while also being judged for their attitudes and academic levels by student-athletes and non-student-athletes alike. We believe that student-athletes are often held in a negative light because non-student-athletes exaggerate the amount of benefits student-athletes received while underestimating the amount of sacrifices student-athletes must make.

Impact of Intermittent Glucose Oscillations on Vascular Endothelial Cell Inflammation

Meagan Marshburn, CURO Research Assistant
Dr. Nathan Jenkins, Kinesiology, College of Education

People with type 2 diabetes are at elevated risk for cardiovascular diseases, in part due to intermittent extreme high and low oscillations in blood glucose levels. Exercise has been shown to improve glycemic control, yet the implications of this effect for cardiovascular health are not known. The aim of this study is to determine the effect of intermittent high and low glucose oscillations on vascular endothelial cell inflammation using an in vitro model system. Cultured endothelial cells will be exposed to a variety of glucose solutions based on research-supported postprandial glycemic fluctuations over two and a half hours to mimic the blood glucose response to a high carbohydrate meal in humans. Experimental conditions include conditions mirroring the typical responses observed in people with (i) normal glucose metabolism, (ii) mild type 2 diabetes, (iii) severe type 2 diabetes, and (iv) when people with diabetes perform a light walk 30 minutes after a meal. The endothelial response will be quantified by examining the expression of inflammatory markers (vascular adhesion molecule 1, intercellular adhesion molecule 1, E-selectin, and tumor necrosis factor-alpha). Expression of these markers will be assessed at the mRNA level by PCR and the protein level via flow cytometry. We hypothesize that there will be a significant reduction in endothelial cell inflammation under exercising postprandial glucose conditions compared to

the type 2 diabetic condition. The results of this study could contribute to the understanding of mechanisms underlying the beneficial effects of exercise on cardiovascular health among individuals with type 2 diabetes.

Expanding Polymer Usage for 3D Printing in Tissue Engineering

Andrew Martin, CURO Research Assistant
Paul Cray
Dr. Jason Locklin, Chemistry, Franklin College of Arts & Sciences

Tissue engineering has incorporated the use of 3D printing, most commonly Fused Deposition Modeling, to direct and develop cells and tissues both *in vitro* and *in vivo*. The current number of choices for polymers to be used in medical device implants remains small, especially in load bearing cases. Several new and previously uninvestigated polyesters and blends – Polyhydroxybutyrate Acid, Polylactic Acid/Polycapralactone, and Polyhydroxybutyrate Acid/Polycapralactone – have been provided in pellet form from Meridian Holdings Group, MHG, for investigation. Optimal printing and extrusion conditions were investigated for the construction of high quality 3D printed constructs. Variables such as extrusion temperature, cooling rate, and tension were investigated to generate 3D printed filament 1.70 ± 0.05 mm. Once the filament generated, 3D print temperatures and extrusion rates become variables for optimization Young's Modulus. Trials investigating filament extrusion temperatures began at 190 degrees C. Extrusion temperature displayed a direct relationship with ductility, exemplifying the need for constant tension with filament development. Measurements are taken of cooled filament once steady state has been reached. Cell viability testing of these polymers will be completed in future work.

Effects of Tempol, a Superoxide Dismutase Mimetic, in Alleviating *Plasmodium chabaudi* Oxidative Stress during Pregnancy

Omar Martinez-Uribe, CURO Research Assistant
Dr. Julie Moore, Infectious Diseases, College of Veterinary Medicine

Plasmodium chabaudi AS-infection in pregnant C57BL/6J mice results in mid-gestational pregnancy loss associated with increased systemic pro-inflammatory response and oxidative stress. It is well known that oxidative damage is one of the most important pathological consequences of malaria infections. This study aims to assess the effects of Tempol, a superoxide dismutase mimetic and pleiotropic intracellular antioxidant, in alleviating *Plasmodium chabaudi* AS-induced oxidative stress and its associated complications during pregnancy. Gestational Day 0-infected and -uninfected pregnant C57BL/6J mice were treated with Tempol (100mg/kg) or vehicle from Gestational Day 6 to 12 via drinking water. The drug was safe, evidenced by the absence of significant differences of clinical parameters in Tempol-treated mice versus vehicle-treated mice. More importantly, 4-hydroxynonenal, an α,β-unsaturated hydroxyalkenal that is produced by lipid peroxidation in cells, was significantly reduced in conceptuses of infected pregnant Tempol-treated mice. However, Tempol treatment did not rescue pregnancy loss in this model, suggesting that oxidative stress may not be the only pathological mechanism by which *P. chabaudi* AS-infected mice abort at mid-gestation. Experiments are underway to further elucidate the mechanisms of antioxidant therapy in malaria during pregnancy.

Elucidating the Functional Role of Chondroitin Sulfate Proteoglycans in the Extracellular Matrix for Use in Rationally Designed Glycomaterials

Hannah Mason, CURO Research Assistant
Dr. Lohitash Karumbaiah, Animal & Dairy Science, College of Agricultural & Environmental Sciences

Chondroitin sulfate proteoglycans (CSPGs) are a family of extracellular matrix proteins that play a variety of roles in growth and development. CSPGs are also thought to be potent inhibitors of neuronal regrowth after injury. However, contrasting evidence also suggests that they are key components of the neural stem cell (NSC) niche, where they are thought to be responsible for the maintenance and self-renewal of neural stem cells. We hypothesize that the seemingly paradoxical roles played by CSPGs are largely due to the diversity of their sulfated glycosaminoglycan (GAG) side chains. In order to uncover the diversity and functional attributes of CSPG associated CS-GAGs, we purified CSPGs from mice brains and analyzed CS-GAG content via SAX-HPLC. Contrastingly, results from these preliminary assays revealed a significantly higher expression of dermatan sulfate when compared to chondroitin sulfate. In ongoing studies, we are investigating the effects of presenting monosulfated or oversulfated CS-GAGs on 2D substrates, and in 3D hydrogels on human neural stem cell homeostasis.

Financial Stress among College Students

Blake Mathews, CURO Research Assistant
Dr. Brenda Cude, Financial Planning, Housing & Consumer Economics, College of Family & Consumer Sciences

Previous studies have shown a negative correlation between financial stress and academic performance, so the feasibility and practicality of measuring financial stress appears to be a worthwhile research question. Using data gathered in survey results of UGA students since 2008, the pre-existing financial stress instrument used in this study assesses 13 different components of the financial stress of students. Students that took this financial stress survey also provided other information, such as their college of study, age, gender, and whether they took out student loans. Students were asked to indicate a stress level of between one and four for the 13 different components of the test, which resulted in an average total of 24.576. The maximum and minimum potential scores were 52 and 13, respectively. Certain traits seem to impact stress in different ways. Using regression analysis, two factors seemed to impact overall stress levels the most: student loans and the college that a student is a part of. On average, students who had taken out student loans for which they were responsible showed significantly higher levels of overall financial stress, while majors in the college of business showed lower levels. Age and gender also impacted certain elements of financial stress. The instrument used has a Cronbach's alpha of 0.82, which suggests that it is a reliable measure. Such a measure could be useful to ascertain students most in need of assistance, allowing for the provision of limited resources to those that would benefit from them the most.

Changing Cones: Students' Images of a Dynamic Situation

Kathryn Mauldin, CURO Research Assistant
Dr. Kevin Moore, Math & Science Education, College of Education

The Common Core State Standards for Mathematics (CCSSM) emphasize the importance of students reasoning quantitatively and modeling, but there is limited research on students' activity as they model dynamic situations, including their images of such situations. Researchers have found that students' quantitative reasoning and images of situations have the potential to

play an important role when students engage in modeling. The goal of this study was to explore the images students leveraged as they made sense of and modeled a relationship between two quantities in a dynamic situation. We used semi-structured task-based clinical interviews to obtain data of ten undergraduate students representing the relationship between the height and the outer surface area of a computer generated dynamic cone that was growing and shrinking. Students relied on various images as they completed this task. Two out of the ten students only leveraged images of quantities changing constantly with respect to time when constructing any relationship within the situation. The remaining students relied on the use of more sophisticated images, such as 2-D and 3-D representations of the cone. Although both the 2-D and 3-D images permitted students to develop feasible solutions, neither type of image guaranteed a correct solution. The results indicate that students developed idiosyncratic images that greatly impacted their solution to the task. Thus, teachers need to be attentive to students' images as they model situations in order to support students in reasoning quantitatively.

The Effects of TnAV-2a on the Complex Interactions between the Parasitoid *Microplitis demolitor* and Various Lepidopteran Species

Johnathan Mayfield, CURO Research Assistant
Dr. Gaelen Burke, Entomology, College of Agricultural & Environmental Sciences

Ridding a crop of devastating agricultural pests requires comprehensive approaches to find an effective solution. One alternative solution to harmful insecticides involves parasitoids, which are insects that parasitize other insects and kill them, all the while completing some of their development within the host. Moreover, many parasitoids are more successful in parasitizing because of mutualistic viruses that evolved from previously pathogenic ones. Thus, studying viruses and their role in the complex interactions between insect parasitoid and host proves beneficial economically and environmentally. The purpose of this study was to explore the complex interactions between the parasitoid wasp *Microplitis demolitor*, the lepidopteran hosts it parasitizes, and TnAV-2a, an ascovirus. TnAV-2a is a pathogenic ascovirus, but there is another ascovirus that is mutualistic with a species of parasitoid wasps, supporting the idea that TnAV-2a could evolve to become mutualistic with *M. demolitor*. Five lepidopteran species were used as potential hosts for *Microplitis demolitor* and include *Pseudoplusia includens*, *Heliothis viriscens*, *Spodoptera frugiperda*, *Trichoplusia ni*, and *Helicoverpa zea*. These same five species were used as hosts for TnAV-2a. *M. demolitor* attempted oviposition in all five species, but *S. frugiperda* and *T. ni* were unsuccessfully parasitized. Furthermore, all species were inoculated with TnAV-2a and showed characteristics of TnAV-2a infection which include arrested development, white hemolymph, and premature death. Preliminary trials of TnAV-2a injections on parasitized lepidopterans show 100% mortality of the wasp larvae within the host. Further research is necessary to fully understand the elaborate interactions between TnAV-2a, parasitoid wasps, and lepidopteran hosts.

The Impact of Severe Weather Events on Market Returns

Thomas McBrearty, CURO Research Assistant
Dr. Bradley Paye, Banking & Finance, Terry College of Business

This paper examines the impact of the monsoon season on equity and bond markets in Southeast Asia. Data consist of daily equity and bond market index returns from six Asian markets (China, Indonesia, Philippines, Japan,

South Korea, Vietnam, Singapore), seasonal indicators capturing the monsoon season, and daily precipitation data from the National Oceanic and Atmospheric Administration. I will test whether variables capturing the effects of the monsoon season relate to equity and bond market returns in affected countries, and whether weather-related variables impact the risk (volatility) associated with these assets. Specifically, I will be measuring the deviation of daily precipitation levels from the annual mean and exploring this deviation's relation to equity and bond returns. This empirical analysis is novel for several reasons. First, most existing studies relating weather conditions to asset prices focuses on US and European markets. Second, much existing research focus on behavioral and psychological channels connecting weather to asset prices. Our study emphasizes the real effects of flash floods, severe drought, and the infrastructure damage associated with the monsoon season in Southeast Asia.

Algorithmic Forecasting through Big Data Analytics

Thomas McBrearty, CURO Research Assistant
Daniel Sanchez, Andrew Angoyar, Carson Aft
Dr. Qing Zhang, Mathematics, Franklin College of Arts & Sciences

"A spontaneous urge to action rather than inaction, and not as the outcome of a weighted average of quantitative benefits multiplied by quantitative probabilities." In these timeless words, John Maynard Keynes described the "animal spirits" by which our economies move and grow. Prior to the advent of the Internet, it was impossible to accurately measure, but thanks to the exponential growth of data from search engines and social networks, it is now possible to gauge the spirits behind the movements. Harnessing data from social networking and search engines, we intend to use multivariate regressions to measure the impact of keyword frequency (e.g. debt, inflation, iPhone, mortgage, retirement) on market indices. It is our intention to parse data in real-time, then measure amplitude of deviation from the predicted numbers as a forecasting tool. Based on a literature review of this relatively new forecasting method and preliminary findings, we expect to find a strong relationship between keyword trends and market movement. Beyond generalities, we believe that there will be strong emergent relationships as the degree of specificity grows, both with the type of index and the keywords analyzed. The significance of this research goes to building more predictive ways of quantifying finance beyond the tools used today. While this may not be viable as an absolute predictor, it will help to explain the underpinnings of the increasingly complex marketplace of the 21st century.

Procedural Polarization: Examining Changes in the Construction of the Roll Call Voting Record, 1877-2012

Jordan McKissick, CURO Research Assistant
Dr. Anthony Madonna, Political Science, School of Public & International Affairs

Scholars of congressional politics frequently report that polarization is at an all-time high. However, these observations are almost exclusively based on longitudinal analyses of roll call vote data. While this has given scholars an accurate impression on how roll call voting has changed over time, less attention has been given to changes in the roll call generating process. We argue this has led to biased inferences about ideology and American political institutions. To gain leverage on this topic, we utilize an original dataset of all amendments to major legislation from congresses sampled from the 45th Congress (1877-1879) to the 111th Congress (2009-2011). Utilizing these data, we examine the link between the ideology of the amendment sponsor and the likelihood a recorded vote was taken. We hypothesize that

desirability of a roll call vote has not been constant across time and amendment sponsor.

The Photodissociation of SH+ in the Interstellar Medium

Elizabeth McMillan, CURO Research Assistant
Dr. Phillip Stancil, Physics & Astronomy, Franklin College of Arts & Sciences

Photodissociation is a chemical reaction that uses photons to break down a chemical compound. This reaction is an important mechanism for the destruction of molecules in the interstellar medium. In the search for novel molecular species in interstellar and circumstellar environments, sulfur-containing molecules have been observed and identified in diffuse and translucent clouds. The sulfur-bearing molecules SH and SH+ have recently been detected in the interstellar medium. SH and SH+ facilitate the formation of other sulfur-bearing molecules, so information about their concentrations is necessary for the investigation of the chemical composition of astrophysical environments. As searches for new molecular species continue, molecular destruction processes involving sulfur are of considerable interest. These molecular destruction processes, along with other processes, can be used to create a chemical network that can predict the concentrations of major sulfur species in various astrophysical environments. Using ab initio molecular potential energy curves and transition moments, as well as quantum-mechanical processes, we have carried out calculations for the photodissociation of SH+. Prior to this study, no calculation of the destruction rate of SH+ through photodissociation had been performed. This calculated photodissociation rate can be used to improve sulfur chemical network models, giving astronomers a better idea of the concentrations of sulfur-bearing molecules in various astrophysical environments.

Examination of Localization of *Mycoplasma pneumoniae* in relation to Tethered Mucins MUC1 and MUC4

Alison McWhorter Anderson, CURO Honors Scholar
Dr. Duncan Krause, Microbiology, Franklin College of Arts & Sciences

Walking pneumonia is a chronic infection most commonly seen in young adults and children, caused by the bacterium *Mycoplasma pneumoniae*. Infections are transmitted by aerosol, allowing the bacteria to infect the ciliated epithelium of the conducting airways. We use Normal Human Bronchial Epithelial (NHBE) cells in an *in vitro* model because they create a mucocilliary barrier comparable to the one that forms in the human airway *in vivo*. Previous studies demonstrated that *M. pneumoniae* attaches initially to the cilia and then slowly spreads laterally on the epithelial surface. In addition, it is also known that localization of the tethered mucins MUC1 and MUC4 differs on cilia from the rest of the cell surface. Based on this knowledge, we hypothesize that the localization of MUC1 and MUC4 affects the speed by which *M. pneumoniae* spreads on infected cells. We predict that the cells in this study will show distinct colonization patterns consistent with this hypothesis, and our goal here is to test that hypothesis by correlating *M. pneumoniae* infection patterns on NHBE cells with MUC1 and MUC4 distribution. We infected underdeveloped and terminally differentiated NHBE cells with *M. pneumoniae* for four hours and then examined *M. pneumoniae* localization in relation to that of MUC1 and MUC4 by using immuno-histochemical staining and fluorescent and scanning laser confocal microscopy. Preliminary results have shown that MUC1 and MUC4 localization patterns differ on both underdeveloped and terminally differentiated NHBE cells.

Abstracts

Concussive Traumatic Brain Injury Therapy Using iPSC-NSCs in a Porcine Model

Mary Mehegan, CURO Research Assistant
Dr. Franklin West, Animal & Dairy Science, College of Agricultural & Environmental Sciences

In the year 2000, 2.5 million people suffered from a TBI. In the United States alone, approximately 50,000 deaths result from TBI annually, with toddler-age children being the most affected demographic. At this time, there is no adequate TBI treatment available. Recently, the West Laboratory developed induced pluripotent stem cell-derived neural stem cells (iPSC-NSCs). These iPSC-NSCs may potentially serve as a regenerative cell replacement therapy, as they are capable of differentiating into neurons, astrocytes, and oligodendrocytes and produce regenerative factors such as VEGF. These cells have been shown to lead to significant structural and functional improvement in rodent models that have suffered similar neural injuries. However, treatments that have been developed in rodent models have regularly failed in clinical trials, and therefore more predictive large animal models are needed. The pig serves as a potentially excellent large animal model, with a large gyrencephalic brain that has gray-white matter composition similar to humans, unlike rodent models. In this study, we propose to develop a novel piglet concussive TBI module. We hypothesize that piglets receiving a corticalimpact at 2, 4, and 6 meters per second will develop brain lesions, show changes in inflammatory response, macrophage infiltration, and glial scaring, and show changes to motor function deficits ranging from mild to severe based on impact speed. Development of this model will allow for the testing of efficacy and safety of novel stem cell therapies as well as traditional pharmacological and device approaches.

Evolution of Root System Morphology and Nitrogen Uptake in Genus *Helianthus*

Benjamin Miller, CURO Research Assistant
Dr. Lisa Donovan, Plant Biology, Franklin College of Arts & Sciences

The acquisition of nutrients from the earth to the plant is a key function of the root system; however, how plant root systems have evolved across soil fertility gradients is not well understood. We examined three pairs of *Helianthus* species chosen as phylogenetically independent contrasts with respect to native soil fertility to further understand the relationship between local adaptation, root morphology, and nitrogen (N) uptake levels. Morphology was measured using the appropriate length measurements, and N uptake was tracked through isotope 15N. While N supply in all experiments remained the same in all species, species native to low nutrient soils exhibited a higher rate of N uptake, higher root tissue density, and lower overall root mass relative to their high nutrient adapted sister-species. In contrast, species native to high nutrient soils had a higher root/mass ratio and a higher total root length. The consistent differences detected between species native to soils differing in nutrient availability indicate repeated evolution of root morphology and nutrient uptake traits across nutrient gradients. The significance behind this study is that N uptake and root morphology likely play an important role in adaptation to soil fertility levels. This study provides information for breeding crops which can efficiently use soil resources and prevent wasted products.

Practical Grant Writing

Jennifer Milley
Dr. Fran Teague, Theatre & Film Studies, Franklin College of Arts & Sciences

This research project centered around the methods and practices of writing a successful

grant. Grants are awarded throughout the academic and professional world as means to fund a broad spectrum of projects, studies, etc., and are an integral part of the financial structure of our world. Thus, as a skill, grant writing is a highly valuable and useful tool for nearly every profession and area of study. The research took two directions: research into grant-writing and research into three children's theatre companies. The culmination of this research was to write a mock grant which requested funding to start an international children's theatre festival in Athens with the purpose of providing community outreach and education. The festival would last for three days and incorporate performance and workshops from three children's theatres which have a strong educational component. The oral presentation will discuss the different parts of a grant and the steps to take to gather the appropriate information in order to write a successful grant. Examples of each step will concern the theatre companies, why they were chosen, and the benefits of having such a festival in the Athens area.

Purification of Hirano Bodies in *Dictyostelium discoideum*

Sandip Minhas, Foundation Fellow
Dr. Marcus Fechheimer, Cellular Biology, Franklin College of Arts & Sciences

Hirano bodies are paracrystalline structures that have been found in the post-mortem examination of human brain tissue. They have been shown to be associated with aging, diabetes, alcoholism, cancer, and neurodegenerative diseases such as Alzheimer's disease. Hirano bodies are composed primarily of filamentous actin and actin-associated proteins. The study of the physiological significance of Hirano bodies has been hampered by the lack of a model in living cells. Our laboratory induced the formation of model Hirano bodies in *Dictyostelium*, cultured mammalian cells, and transgenic mice. Hirano bodies protect cells from death induced by the intracellular amyloid precursor domain, enhance death due to forms of tau in frontotemporal dementia, and cause impaired spatial memory in mice. The goal of this project is to purify model Hirano bodies in *Dictyostelium* in order to determine the protein composition of these inclusions. The cells were lysed, and the Hirano bodies were collected using low speed sedimentation and fractionation with iodixanol gradients. The fraction containing the Hirano bodies was analyzed for purity of the inclusions by searching for the presence of various other cellular components such as cell nuclei and mitochondria. Gel electrophoresis and western blotting was used to initially identify possible proteins present in the Hirano bodies following the density gradient purification. Mass spectroscopy was subsequently utilized to identify the candidate proteins from the fraction containing the Hirano bodies. Future research conducted in this area will examine and verify the roles of the suspected proteins in the formation of Hirano bodies.

Promoting Products, Cutting Costs: Advertising Industry Strategies and Tactics in the United States, 1973-1976

Sapna Mistry, CURO Research Assistant
Dr. James Hamilton, Advertising & Public Relations, Grady College of Journalism & Mass Communication

The purpose of this study is to a) explore possible relationships between specific advertising strategies and tactics, and overall national economic health, and b) document specific ways in which consumers were directly involved in marketing communication prior to the rise of the Internet and user-generated content. The assumption guiding research design was not only that advertising strategies and tactics change to adapt to times of economic hardship, but that building relationships with consumers and involving

them more directly in marketing communication has long been a key cost-cutting measure in place, not only recently instituted with the rise of the Internet. To investigate this assumption, researchers examined 105 randomly selected issues of the advertising trade journal *Advertising Age* from the years 1973-1976, which was a time of national recession and stagflation. Every item was coded that mentioned a form of direct consumer involvement in marketing. Frequencies of different forms were plotted over time and compared with each other. The data lend support to the assumption. At the start of 1973, *Advertising Age* stories noted the value of contests, sweepstakes, and other games that directly engaged their target markets. By the end of 1973 and into 1974, the frequency of items that mentioned the use premium incentives also increased. By the end of 1976, as the national economy came out of the recession, the frequency of mentions of premium incentives decreased as presumably greater resources were now available to engage in more costly forms of marketing communication, such as traditional advertising.

***Gracilaria vermiculophylla's* Impacts on Herbivory in Georgia's Coastal Ecosystems**

Timothy Montgomery
Dr. Jeb Byers, Odum School of Ecology

There are an unprecedented number of non-native species, with the potential to alter critical ecosystem functions or services, colonizing habitats around the world. *Gracilaria vermiculophylla* (hereafter referred to as *Gracilaria*) is an invasive red seaweed that is highly tolerant of various physical stresses such as temperature and salinity. These tolerances enable it to persist in a wide range of conditions. Georgia is relatively void of any native seaweed species, thus *Gracilaria* represents a source of primary production with potential to alter key ecosystems. Georgia's coastal marine communities have historically been fueled by detritus and the microphytobenthos; however, with the introduction of *Gracilaria*, there is potential for food webs to be based off of macrophyte primary production instead. We conducted a series of feeding experiments consisting of isolated non-choice and choice (*Gracilaria* vs *Ulva*) trials with local marine herbivores: *Eurypanopeous depressus, Ilyanassa obsoleta*, *Lagodon rhomboids*, and the invasive *Synidotea laevidorsalis*. All listed species are locally abundant and categorized as generalist herbivores. Our results suggest that native herbivores do not consume *Gracilaria*; however, the invasive *S. laevidorsalis* significantly consumed *Gracilaria*. This suggest that *Gracilaria* may be largely avoided by generalist because of its chemical defenses, since they are likely yet to develop methods of dealing with such chemical defenses.

Cloning, Expression and Purification of MexT and AmpR from *Pseudomonas aeruginosa*

Kathryn Moore
Dr. Cory Momany, Pharmaceutical & Biomedical Sciences, College of Pharmacy

Pseudomonas aeruginosa is a prevalent hospital pathogen and a leading cause of death in patients with cystic fibrosis. One feature of its high virulence is attributed to its innate antibiotic resistance. Two LysR-type transcriptional regulators (LTTR's) found in *P. aeruginosa,* MexT and AmpR, are known to regulate the transcription of molecules involved in this antibiotic resistance. MexT is a transcriptional activator of the drug efflux pump gene, *mexEF*. Expression of the MexEF transporter leads to the activation of antibiotic resistance against multiple drugs, but significantly against tetracycline. AmpR is a regulator of the gene encoding a β-lactamase, AmpC, which provides penicillin resistance. The *mexT* gene was successfully cloned, and the MexT protein purified from

E. coli cells overexpressing the protein. Additionally, the gene encoding AmpR was cloned, and purification of the protein is in progress. Ultimately, the goal is to crystallize both MexT and AmpR and then to determine their atomic structures by X-ray crystallography. Thyme extracts, which have antibiotic activity against *P. aeruginosa*, will be evaluated as a source of small molecule inhibitors of MexT and AmpR function. Small molecules that bind to MexT or AmpR and inhibit transcriptional activation could be lead compounds for the development of the next generation of antibiotics.

Exploring Evolution in the Classroom: Developing a Hands-On Activity Using *Mimulus guttatus*

Ananya Moorthy, CURO Research Assistant
Dr. Andrea Sweigart, Genetics, Franklin College of Arts & Sciences

My research project aims to create a hands-on laboratory activity for local high school biology students that teaches important concepts in genetics and evolution. The activity I have developed focuses on adaptation to serpentine soils in the yellow monkeyflower (*Mimulus guttatus*). This wildflower species shows tremendous ecological variation in nature, and certain populations have evolved tolerance for the metal saturated environment that characterizes serpentine soils. Currently, I am working to optimize assays to measure serpentine tolerance in *M. guttatus*. I have developed a hydroponic solution to test for differences in seedling germination and survival between individuals collected from natural populations that occur on and off serpentine soils. Previous research has shown differences in serpentine tolerance among adult plants, but a focus on seedlings will allow the experiment to be easily reproduced in a classroom with limited resources. Throughout this project I will be working on a lesson plan to be used in local high school classrooms. This experiment will allow teachers to supplement their evolution unit in the classroom, as well as give students in the Athens area a glimpse of a university science research lab.

Assessment of Proteomic and Glycomic Profiling of Medaka (*Oryzias latipes*) to further the Understanding of the Physiological Response to Low Level Ionizing Radiation

Jason Moraczewski, CURO Summer Fellow, CURO Research Assistant
Dr. Carl Bergmann, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Ionizing radiation (IR) is recognized to cause proteomic changes in various organisms. Most prominent studies performed in the field of proteomics primarily focus on the effect of radiation at acute, high doses. However, very little is known about the biological responses when organisms are exposed to chronic, low levels of ionizing radiation. Using medaka (*Oryzias latipes*) as the model aquatic organism, this study will examine the physiological responses to chronic, low-dose IR. Specifically, the proteome and glycome of medaka will be analyzed to quantify any changes that have occurred due to the low levels of IR. The first part of the project is aimed to standardize the methodology for protein extraction and protein fractionation using a control group and a high dose group. Mass spectrometry and bioinformatics will be used to help elucidate any metabolic pathways associated with adaptation to IR exposure. This will advance the understanding of how IR can affect evolutionary processes.

The Effects of Travel on Team-Based Performance

Christopher Morgan, Kyle Ledesma, Rebekah Trotti, Parker Thomas
Dr. Karl Kuhnert, Psychology, Franklin College of Arts & Sciences

We examined the relationship between distance traveled to work and job performance. As teams in the workforce are required to go on longer trips, the impact of travel is becoming more relevant. Current research indicates that travel induces stress, but there has been little to no research on how travel influences job performance. Using team-based sports data, we examined the relationship between distance traveled and job performance. In addition, we evaluated how the total accumulated miles that teams travel impacts the relationship between travel and performance. Similarly, we looked at how a team's average job experience affects the relationship between travel and performance. Our study shows that the further teams travel for their job, the worse they perform. However, our research indicates that employees are less sensitive to trips over time. The findings of our study are important because there are tangible consequences of travel for one's job. Based on our findings, employers should seek alternative methods for long distance work. However, if travel is inevitable, organizations should be aware that with more trips the negative effects of traveling are weakened. Organizations can further reduce these adverse effects by selecting teams with more average job experience.

High Dynamic Range Imaging For X-ray Image Acquisition

Logan Morrison, CURO Research Assistant
Dr. Mark Haidekker, College of Engineering

X-ray images made from objects with very dense and less dense materials (e.g., bone and muscle tissue) often require a balance between long exposure times that make details in the dense material visible and shorter exposure times that prevent overexposure of the background and less dense regions. In quantitative x-ray images, such as DEXA images for bone densitometry, background information is crucial for normalization of the measured intensities, and overexposure cannot be accepted. High dynamic range imaging (HDRI) is a method presently becoming popular in digital visible-light photography. It involves combining well-exposed pixels from a bracketing series of photographs into one image that represents the actual physical irradiance of the scene. We have adapted this principle to x-ray images, whereby multiple images of the same specimen were taken with varying exposure times. These images were then combined into a composite with only the best exposed pixels from the series accepted into the composite. Moreover, pixel intensities were scaled to match that of the background intensity, and the composite image reflects actual sensor irradiance in exposure regions where otherwise there would be only noise. Accuracy and effectiveness of this method have been demonstrated with calibration phantoms, bone phantoms, and common specimens that contain extremely inhomogeneous densities. HDRX, as we call this method, can be universally applied to any biomedical x-ray imaging system and for non-destructive materials testing purposes to increase the density range in which useful x-ray data can be obtained.

The Effect of Race and Household Structure on Adolescent Alcohol Use

Santana Mowbray
Dr. Natasha Ganem, Sociology, Franklin College of Arts & Sciences

Past research has examined two-parent versus single-parent homes and the delinquency of teens from these households, but few have examined in depth, household structure and

race and its effect on the use of one substance in particular: alcohol. The data for this research was drawn from 5,935 teens who completed a survey on the evaluation of the Gang Resistance Education and Training Program (GREAT) conducted between 1995 and 1999. There are three questions to be addressed in this research: 1) Does race impact the likelihood of teens drinking alcohol? 2) Does household structure (Mother only vs. Both Mother and Father) have an impact on the likelihood of teens drinking alcohol? 3) Does household structure as a third variable have any impact on race in determining a teen's likelihood to drink alcohol? Responses to questions regarding household makeup, race, and alcohol use were drawn from the survey and statistical measures were used to determine the significance of the results. Based on the Social Bond Theory and previous research examining alcohol use, it was hypothesized that teens from "Mother only" households will be more likely to use alcohol. Additionally, it was hypothesized that due to differences in how households are broken up within different racial groups, White teens will be more likely to use alcohol than Black teens. All hypotheses were supported in this research. The results show that household structure amplifies the effects of alcohol use, particularly among teens in single, "Mother only" homes and more specifically among White teens.

Function of Kinesin Proteins in *Toxoplasma gondii*

Kurt Mueller
Dr. Boris Striepen, Cellular Biology, Franklin College of Arts & Sciences

Toxoplasma gondii is a parasitic protozoan and an important human pathogen that causes toxoplasmosis. It is estimated that *T. gondii* infects up to 33% of the world's population. This disease is usually asymptomatic, but can greatly affect individuals with weakened immune systems, such as pregnant women and those with AIDS. Toxoplasmosis has been linked to numerous neurological diseases and can cause encephalitis. *T. gondii* is also a good model for understanding diseases caused by similar parasites such as malaria. This parasite uses a variety of conserved proteins, such as kinesins, that are common to other organisms. Kinesins are motor proteins that move along microtubule filaments and serve a variety of cellular functions such as meiosis, mitosis, and cellular transport. We hypothesize that kinesin proteins play a role in each step of endodyogenous replication of *T. gondii*. Using epitope tagging, protein markers, transformation, and immunofluorescence assay microscopy, we localized and characterized various kinesin proteins throughout the *T. gondii* cell cycle. Proteins such as Kinesin-5 and Kinesin-14S localize to the centromere during metaphase and anaphase of mitosis, while proteins such as Kinesin-14 and Kinesin-8-Kinesin-4/10 localize to the conoid of daughter budding cells during mitosis. Kinesin-14L localizes to the leading edge of daughter buds in replicating cells. The data will also show that inducible knock down of these proteins results in decreased viability, structural morphology, and invasive ability of *T. gondii*. Further studies will determine which proteins are most essential for parasite viability and may have significant medical implications.

Neural White Matter Alterations in Schizophrenia

Megan Murphy, Ramsey Scholar
Dr. Jennifer McDowell, Psychology, Franklin College of Arts & Sciences

Cognitive control (CC) refers to the management of processes such as working memory, attention, and task flexibility. Patients with schizophrenia (SZ) frequently exhibit low CC. Some healthy subjects from the general population, however, exhibit similarly low CC. Deficits in CC are apparent

at the level of neural white matter (WM) connections such as the superior longitudinal fasciculus (SLF), which connects frontal, parietal, and temporal regions, mediating several CC processes. Reduced WM integrity in SLF is linked to lower scores on CC tasks. In this study, we assessed WM integrity in patients with SZ and otherwise healthy individuals with high or low CC (HCC, LCC). We hypothesized that WM integrity of SLF would be greater in the HCC group than the SZ group but would not differ between the LCC and SZ groups. We recruited 24 patients with SZ; 49 healthy participants were recruited and divided into HCC (n = 24) and LCC (n = 25) groups based on performance on a working memory task (SSPAN). Diffusion tensor imaging scans were performed and analyzed using fiber tracing software to obtain fractional anisotropy (FA) values for the SLF. FA is a measure of WM integrity with higher values indicating more efficient myelin structure. FA was significantly higher in the SLF for the HCC group than the SZ group, but no FA differences were found between the LCC and SZ groups. This suggests that WM differences in SLF between healthy and SZ groups may be more attributable to CC differences than to disease.

Carbohydrate T cell Recognition and Presentation

Seema Mustafa, CURO Research Assistant
Dr. Fikri Avci, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

The overall purpose of our research is to identify the mechanism of molecular interactions involved in how carbohydrate antigens are taken in by the cell, processed and presented by antigen presenting cells (APCs). My aim in this project is to isolate and characterize T cells specific for the synthesized Pn3-TT antigen and aid in characterizing their corresponding epitopes from the carbohydrate moieties. It was demonstrated in Dr. Avci's *Nature Medicine* paper, "A mechanism for glycoconjugate vaccine activation of the adaptive immune system and its implications for vaccine design" that carbohydrates that were previously considered to be "T-cell independent" antigens are in fact recognized by carbohydrate specific CD4+ T cells (Tcarbs). Recent research has shown monosaccharides and oligosaccharides that are glycosidically linked to peptides can be recognized by T cells. T cell recognition of these glycopeptides depends on the structure of both the peptide and glycan portions of the antigen. Based on the findings, Dr. Avci explores the role that carbohydrate epitopes generated from glyconjugate vaccines had in activating helper T cells. It was then found that these epitopes are presented to specific carbohydrate recognizing T cells through a unique mechanism that is broadly summarized in his paper. Based on the discovery of T cell specific recognition of carbohydrates that induce adaptive humoral immune response and the scientific literature on the existence and function of glycan specific broadly neutralizing antibodies (bNAbs) against HIV-1, our lab hypothesized that the human CD4+ T cell repertoire contains a population of these T cells that is able to recognize epitopes generated from the N-glycan shield of gp120, and by characterizing them and isolating their glycan epitopes, the lab hopes to design and develop glycoconjugate vaccines that are enhanced for T-cell specific stimulating epitopes, whose immunizations will produce strong and long lasting immune response to protect from HIV-1. Flow cytometry, immunofluorescence, T cell proliferation, and ELISASPOT are the primary experimental techniques utilized in the lab. Immunofluorescence is a technique used for light microscopy with a fluorescence microscope. This technique uses the specificity of antibodies to their antigen to target fluorescent dyes to specific biomolecule targets within a cell, and therefore allows visualization of the distribution of the target molecule through the sample. ELISPOT is a

laboratory technique for detecting cells that make (or "secrete") various substances, more specifically in our case detecting cytokine secretion. Flow cytometry is a laser-based technology employed in cell counting, cell sorting, biomarker detection and protein engineering, by suspending cells in a stream of fluid and passing them by an electronic detection apparatus. A common variation is to physically sort particles based on their properties, so as to purify populations of interest and it was used for the purposes of our lab to determine optimal antibody titrations. Western Blot analysis is used to detect protein and Northern Blot is used to detect RNA.

Analysis of Cancer Mutations in Protein Kinases using Semantic Web Technologies

Anish Narayanan, CURO Summer Fellow, CURO Research Assistant
Dr. Natarajan Kannan, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Protein kinases comprise an extensive superfamily of proteins. These complex biological entities are critical in initiating diverse signal transduction pathways, effecting activation of cellular processes through the phosphorylation of target substrates. In order to improve our ability to study kinases, our lab has developed the Protein Kinase Ontology (ProKinO), which captures and aggregates kinase data from a large variety of publicly available data sources into a queryable format. Using this data, it is possible to create large-scale SPARQL queries which can probe interesting questions and elucidate the fundamental nature of the kinome. In this project, a two-pronged approach is taken to analyzing protein kinases. First, with the assistance of an alignment of all of the protein kinase sequences to PKA, a mutational co-occurrence study is performed to identify interacting residues and key motifs in the kinase domain. Second, the breadth of available data currently available in databases, while vast, is limited to a handful of curated, tabulated tables. By performing a large-scale text-mining analysis of Pubmed Central's Open Access Subset containing over one million articles, it is possible to dramatically increase the knowledge base available in ProKinO. Through the careful and judicious use of NLP (Natural Language Processing) algorithms and skilled curators, the impacts of mutations are effectively extracted from the latest primary literature and research, information which can be used in the future to analyze patient cancers in personalized medicine and prescribe ideal, calculated treatments.

Investigating the Influence of Rac1 and Rho Family GTPases in Hair Follicle Biology

Nina Navalkar, CURO Research Assistant
Dr. Tamas Nagy, Pathology, College of Veterinary Medicine

Rac1 is a small G protein in the RhoA family of small G proteins and is expressed ubiquitously throughout the tissues of the body. Rac1 has been known to promote the cell cycle and oncogenic transformation, hence the interest in its role in mammary carcinogenesis. We previously created a mutant mouse line that has mammary gland specific deletion of Rac1 in the mammary epithelium, using the Cre-LoxP system. In analyzing the phenotype of our mutant mice, we found that Rac1 deletion also occurs in the skin as well as results in a phenotype. Thus, the additional goal of our research has become to understand the role of Rac1 in the maintenance of skin and hair follicles. So far we have tested the deletion of Rac1 using PCR, primers, western blotting, and immunohistochemistry and pursued other experiments in order to learn more about the molecular basis of the observed phenotype. We observed that mice lacking Rac1 (skin specific deletion) displayed early onset

alopecia while displaying no lesions in the epidermis. These results provide evidence for the indispensable role of Rac1 in the maintenance of hair follicles and have advanced existing knowledge of Rho family GTPases in hair follicle biology.

"Please Excuse Me as I Am in Need:" Bondage and Freedom in Civil War-Era Athens

Laura Nelson, CURO Summer Fellow, CURO Graduation Distinction
Dr. Christopher Lawton, History, Franklin College of Arts & Sciences

Studying the lives of slaves challenges outmoded, monolithic mythologies of the past and instead recognizes the enormous struggles and equal contributions of both black and white Americans. This research does so by reconstructing and examining the life of Aggy Mills (1827-1900), an Athenian woman enslaved by the elite Cobb family. She was remarkably literate, and through several extraordinary letters that she wrote to her owners, aspects of her life in slavery and freedom, like her role in her master's home and her place in the multicultural Athenian community, become apparent. Trace details of her life were first seen in these letters, but these only recount a portion of her life. To see Aggy as more than a servant, these letters are examined in conjunction with sources in the Athens-Clarke County Heritage Room, property deeds at the courthouse, census records, and various other local sources. Studying Aggy's life helps to give a more multifaceted version of the antebellum South, one where slaves' and whites' lives were intertwined, and slaves managed to define their own lives outside of the realm of their bondage. This research has been transformed into a digital sketch of Aggy's life as a part of the Georgia Virtual History Project. Viewers can hear Aggy's story and see the places connected to her life via a downloadable app for smartphone or tablet.

Giving Up Appointment Television: How Millennials Are Changing What It Means to Watch Television

Kim Nguyen, CURO Research Assistant
Dr. Karen Whitehill King, Grady College of Journalism & Mass Communication

With the increasing popularity of online streaming services, such as Netflix and Hulu, and the increased price of cable television subscriptions, many millennials are changing the way they watch television content. Selecting alternatives to cable television has given rise to a generation of audience members who have discontinued their cable subscriptions (cord-cutters) and people who have never had cable subscriptions (cord-nevers). While advertisers often target millennials, this generation poses a new challenge for advertisers since reaching them through traditional media is no longer as viable as it was for previous generations. Interviews conducted with college-aged millennials provide insight on the motivations that give rise to these trends, television show viewing habits of cord-cutters and cord-nevers, and what implications their decisions have for the advertising and television industries.

A #whitewashed Landscape: Internalized Racism, Linguistic Discrimination, and the Policing of Ethnic Identity on Twitter

Minh Nguyen, CURO Graduation Distinction
Dr. Chad Howe, Romance Languages, Franklin College of Arts & Sciences

The microblogging platform, Twitter, has enabled individuals to create an online community of searchable conversations by means of the hashtag (#), allowing users to find others who share common interests and values. Using data extracted from Twitter, this study analyzes the English expression *whitewashed* as it occurs with and without a hashtag (ex: #whitewashed vs. *whitewashed*) through corpus analysis. The paper also

investigates the grammatical and semantic functions of the hashtag with regard to the racial meaning of English *whitewashed*. The study explores #whitewashed as a metacomment on human behavior, as #whitewashed serves to characterize beliefs about what actions are considered socially unacceptable with respect to performing an "authentic" ethnic identity. Based on qualitative analysis, the data suggest that the use of #whitewashed, as opposed to *whitewashed* without a hashtag, carries a meaning predominately informed by internalized racism and works to bind ethnic minorities to racial stereotypes. And while #whitewashed is used to refer to many ethnic minorities, the data also show that the most salient meaning of #whitewashed is one linked to national identity and xenophobia. The study explores how online users understand ethnic identities shaped by internalized racism and how they communicate these views through the grammatical function of the hashtag.

The Impact of Runoffs: Electoral Reform and Duvergerian Factionalism in Metropolitan Atlanta

Cameron Niakan, CURO Research Assistant
Dr. Charles Bullock, Political Science, School of Public & International Affairs

In Part I, I address claims made by City of Duluth, Georgia officials that runoff elections: (i) inflict too high of a cost, (ii) draw too small of a voter turnout, and (iii) produce inequitable results. Drawing data from 48 Metropolitan Atlanta cities, I examine 160 municipal election returns and their corresponding election invoices from 1993-2013. (i) I utilize average price per ballot cast as a metric of electoral cost and find that Duluth enjoys inexpensive runoffs in comparison to those of other Metropolitan Atlanta cities. (ii) I render the ratio of average runoff turnout to average general election turnout as a metric of "turnout efficiency" and find that Duluth indeed has poor turnout efficiency, whereas Metropolitan Atlanta as a whole has a strong turnout efficiency. (iii) I define an instance of an "inequitable electoral result" as an instance of the "leader loses" phenomenon and/or of an anomalous majority and find that runoffs in Duluth and in Metropolitan Atlanta are reasonably equitable. In Part II, I test whether municipal elections in Metropolitan Atlanta align with Bradley Canon's findings that electoral rules decide patterns in factionalism. In Part II, I utilize the same election returns as those used in Part I to determine, by electoral system, the average number of candidates that ran per post. I find that Canon's "primary structure" hypothesis does not apply convincingly to patterns of factionalism in Metropolitan Atlanta. Although plurality-rule municipal elections are, on average, almost perfectly bifactional, majority-rule municipal elections lean toward bifactionalism, not multifactionalism.

Cloning and Constructing of a Complete RNA Polymerase from *Acinetobacter*

Hanna Nune
Dr. Cory Momany, Pharmaceutical & Biomedical Sciences, College of Pharmacy

RNA polymerases are multi-subunit proteins that transcribe DNA to RNA. In prokaryotes, the enzyme has five subunits: a b subunit involved in ribonucleotide chain elongation; a b' subunit that contains the active site for nucleotide chain polymerization; two a subunits involved in regulation and DNA recognition; a w subunit; and the s subunit that directs promoter specificity. Although we know a great deal about RNA polymerases, a major question remains: how does RNA polymerase communicate with transcriptional regulators? The objective of this research is to produce RNA polymerase from *Acinetobacter baylyi* ADP1. The first step of this project was to PCR amplify RNA polymerase genes from ADP1. The PCR-amplified DNAs encoding

the b and b' subunits (the *rpoB* and *rpoC* genes) were introduced into the vector pRARE2, which has chloramphenicol antibiotic resistance. Each has its own T7 RNA polymerase promoter and terminator. The PCR-amplified DNA encoding a, w, and s subunits (*rpoA*, *rpoZ*, and *rpoD)* were introduced into the pet-28b vector, which has kanamycin resistance. In this construct, a single T7 promoter is used. The two vectors, pRARE2 and pET-28b are compatible with one another in *E. coli*, where the proteins will be co-translated. Purified RNA polymerase from ADP1 will allow studies to be performed to examine the communication between RNA polymerase and transcriptional regulators. Ultimately, the enzyme will be used to identify small molecules that prevent transcriptional activation. By blocking essential regulatory networks in microorganisms, the resulting therapeutics would represent a new class of antibiotics.

The Influence of Structural Factors on Mental Health of Young Women in Post-Conflict Liberia

Mary Elizabeth Nuttall, CURO Honors Scholar
Dr. Tamora Callands, Health Promotion & Behavior, College of Public Health

The aim of this qualitative study was to identify what and how structural factors influence mental health among young women in post-conflict Liberia. We conducted five focus groups with 49 young women and 16 in-depth key informant interviews. Our interviews focused on identifying the impact of everyday stressors and struggles young women in Liberia encounter. We focused primarily on sexual health, mental health, gender roles, and exposure to violence. In this study, young women described ways in which structural factors influence adverse mental health outcomes. The major interconnections are the result of shifts in family structure and dynamics, compromised interpersonal relationships, and unaddressed trauma stemming from war-related violence. Understanding how these connections impact mental health outcomes is key to developing culturally relevant intervention to reduce mental health issues among young women in post-conflict Liberia.

The Effects of Incumbent and Challenger Campaign Spending on Election Results

Kasey O'Brien
Dr. Anthony Madonna, Political Science, School of Public & International Affairs

The purpose of this research design is to identify the effects of campaign spending and to evaluate policy proposals for campaign finance reform. This will be determined by comparing the effects of additional spending by two types of candidates – incumbents and challengers. The experiment would be limited to House elections; because more House seats are up for election each year, a wider sample is available for testing. The findings would show that, in conjunction with conventional wisdom, the effects on vote shares by challenger spending far outweigh the effects of incumbent spending. However, the second component of this theory breaks from relevant academic literature in that additional spending by both candidates is negligible beyond a certain point. Challenger campaign spending eventually reaches a level that puts them on an "even playing field" with the incumbent. At this maximum threshold, the challenger's spending has granted them the same name recognition and other built-in advantages enjoyed by an incumbent, and the marginal gains of spending by either candidate are relatively equal. The experiment examines campaigns over the course of the election cycle, comparing spending data to polling data. The maximum threshold will be determined by accounting for the challenger political quality, brand name recognition, and number of terms served by the incumbent.

These findings could have implications for campaign spending limits, which, if set below the maximum threshold, could be detrimental to challenger success.

Ryanodine Channel Protein in Insects: A Novel Pesticide Target

Onyinyechi Ochiobi, CURO Research Assistant
Dr. Michael Adang, Entomology, College of Agricultural & Environmental Sciences

Ryanodine receptor (RyR) proteins are large-sized calcium channel proteins located in the sarcoplasmic/endoplasmic reticulum that regulate calcium signaling between muscle and neural cells in animals. Ryanodine is a compound in a neotropical bush that is a natural insecticide which locks the calcium channel causing irreversible muscle contraction and insect death. Diamides are synthetic forms of ryanodine with high specificity for caterpillars. Diamides have a critical role in managing caterpillar pests in cotton, soybean, and other crops. However, resistance in the diamondback moth has stimulated interest in RyR proteins of field insects that differ in susceptibility to diamides. My thesis is that by cloning a soybean looper RyR, we can model RyR structure and conduct analyses of RyR-diamide interactions. In our present study, the full length cDNA of *Chrysodeixis includens* RyR (CiRyR) was cloned from adult looper thorax mRNA. CiRyR cDNA contains a 15273-bp ORF encoding 5090 amino acids with a predicted molecular weight of 574.9 kDa. CiRyR has up to 99% amino acid identity with other lepidopteran RyRs. All common conserved structures are present in CiRyR, including six transmembrane domains at C-terminal and a consensus calcium-binding site. Other conserved domains such as MIR (Mannosyltransferase, IP3R and RyR) domains, RIH (RyR and IP3R Homology) domains, SPRY (splA and RyR) domains, and RyR domains (RyR repeated domain) were identified in CiRyR. Significantly, three alternative splice sites were identified in the CiRyR gene. These results provide the foundation to analyze and understand the relationship between structure and function of RyR in *C. includens*.

Transcriptional Interference and Regulation of the Hyb Hydrogenase Operon of *Salmonella*

Selin Odman, CURO Research Assistant
Dr. Anna Karls, Microbiology, Franklin College of Arts & Sciences

Bacterial transcription initiation requires a sigma factor to interact with core RNA polymerase for identification of promoters and opening double stranded DNA. Sigma54 interacts with unique promoter sequences and atypically requires the presence of a DNA-bound activator capable of hydrolyzing ATP to initiate transcription. Recent microarray and ChIP-chip (Chromatin Immunoprecipitation linked to microarray analysis) assays in *Salmonella* Typhimurium (SalTy), which detected sigma54-regulated genes and sigma54-holoenzyme DNA binding sites, identified an antisense sigma54-dependent promoter associated with annotated transcription start sites for the hyb hydrogenase operon. Activation of this sigma54-dependent promoter appears to be associated with decreased transcription of the hyb operon. This novel promoter was identified in the presence of a constitutive, promiscuous activator of sigma54-dependent transcription6, so the focus of this work is to define the physiologically-relevant conditions that activate expression of this sigma54-dependent promoter. Two of four SalTy hydrogenase operons are known to have sigma54-dependent promoters in *E. coli* and are controlled by the activator FhlA. FhlA is activated by anaerobic conditions and formate; it stimulates transcription from promoters that have an associated DNA binding site for FhlA. I am currently

evaluating transcrition from the sigma54-independent promoters for the hyb operon and the antisense sigma54-dependent promoter using a plasmid reporter system and quantitative reverse transcriptase polymerase chain reactions (qRT-PCR). This work is predicted to establish the native activation conditions for the antisense sigma54-dependent promoter indicated to interfere with transcription from the hyb operon promoters in assays performed with the constitutive, promiscuous activator.

Efficacy and Effectiveness Study of Instructional Conditions When Using IRIS Modules in Teacher Preparation

Susan Oh, CURO Research Assistant
Dr. Kristin Sayeski, Communication Sciences & Special Education, College of Education

IRIS multimedia modules, created by Vanderbilt University, are a promising avenue for increasing teacher candidates' knowledge and skills, but research was needed to verify the efficacy of the modules and the effectiveness of the modules under different instructional conditions. The following research questions were addressed: to what extent do IRIS modules increase candidate knowledge of special education related content; is there a relation between instructional condition and learning outcomes for select IRIS modules; does instructional condition influence participants' perception of the overall importance of the content addressed by the module and degree to which the content was learned; and when provided with three different instructional conditions, do candidates express a clear preference for one condition? For this research project, we examined the efficacy of three IRIS modules under three different instructional conditions, which were: Independent condition–where participants completed the modules on their own time outside of class; "Flipped classroom" condition–where participants completed the module independently and then participated in a class discussion and an application activity; and Facilitated condition–where module completion was facilitated by an instructor. 115 participants enrolled in an introductory special education course at a large public university participated in this study. The study employed an experimental pretest-posttest-maintenance across three instructional conditions design. Each week, participants engaged in a different instructional condition with a different IRIS module. The following data were collected as a part of the study: (a) a pretest, posttest, and maintenance assessment for each module (b) five Likert-tye questions immediately following completion of each module and (c) a final questionnaire related to participants' overall preferred instructional condition. Results demonstrated the efficacy of the modules across all instructional delivery formats and a preference for the Flipped (n = 52) and Facilitated (n = 35) instructional conditions. There were significant differences across all three instructional conditions from pretest to posttest with significant effect sizes (PALS module = $F(1.94, 203.49) = 378.67$, $p < .001$; Classroom Management module = $F(2) = 55.80$, $p < .001$; Accommodations module = $F(2) = 94.11$, $p < .001$). In addition, a significant effect for instructional condition was found for the PALS module only. As the majority of content learned in the PALS module relates to how to implement this evidence-based approach, it can be inferred that the implementation of the role-play activity for the Flipped condition supported participants' understanding and knowledge of PALS implementation, thus contributing to higher scores. Overall, findings from the study demonstrate that IRIS modules are successful in teaching the content. Future research should explore knowledge associated with planning and skills related to implementation to determine if the Flipped and Facilitated condition produced learning not assessed by the multiple-choice assessment.

Abstracts

Genetic Determination of Obesity Induced Inflammation and Blood Brain Barrier Alterations

Whitney Okie, CURO Research Assistant
Dr. Robert Pazdro, Foods & Nutrition, College of Family & Consumer Sciences

Obese patients exhibit an increased risk for chronic diseases such as cardiovascular disease, diabetes, and several cancers. The genetic mechanisms that couple obesity and disease are incompletely defined. Mouse studies have addressed this issue by examining the effects of diet-induced obesity in strains exhibiting disparate sensitivities to a high-fat diet. In the present study, we tested whether obesity-induced changes in gene expression are determined by genetic background in three obesity-prone inbred mouse strains: C57BL/6J (B6), DBA/2J (D2), and AKR/J (AKR). Mice from each strain were assigned to either a control (10% fat) or high-fat (60%) diet for 10 weeks, after which tissues were harvested. Expression of genes related to inflammation (IL-6, IL-1β, TNFα) and blood-brain barrier (BBB) integrity (Claudin-5, Occludin) were analyzed by qPCR. Obesity caused a decrease in liver IL-6 ($p = 0.0035$) in B6 mice and an increase in liver IL-1β ($p = 0.005$) in AKR mice. Obesity also caused an increase in the Blood Brain Barrier marker Occludin in AKR ($p = 0.044$). DBA/2J did not show a significant change in expression in any of the three inflammatory markers, and heart tissue was also consistently resistant to obesity-induced changes in gene expression. Our results suggest that obesity-induced changes in gene expression are: 1) dependent upon genetic background and 2) tissue-specific.

Examining the Digestibility of Methionine in Poultry

Ijeoma Okoye, CURO Summer Fellow, CURO Research Assistant
Dr. Sammy Aggrey, Poultry Science, College of Agricultural & Environmental Sciences

L-Methionine is an essential amino acid required for protein synthesis and normal growth of animals. It is also the first limiting amino acid in a typical corn-soy poultry diet. Utilization of protein or amino acids is affected when deficient or excess levels of a limiting amino acid are supplied. Amino acids interact, and amino acid transporters maintain coordination and integrity of metabolic events. Since methionine is the first limiting amino acid in poultry diet, deficiency in or excess of dietary methionine has the potential to affect nutrient availability and molecular transport. We investigated the growth, feed intake, feed conversion ratio, digestibility, and ileal molecular expression of amino acid transporters in a chicken population fed deficient (DEF: 75% of requirement), normal (CONT: 100% requirement) or excess (EXC: 125% of requirement) dietary methionine over an 18 day period. The body weight gains were 1.52, 177 and 1.64 kg in the DEF, CONT and EXC groups, respectively. There were significant differences in feed intake, digestibility and amino acid transporter expression among the groups. Dietary methionine needs to be optimal to support growth. Deficiency or excess in dietary methionine can affect growth through differential digestibility and nutrient transport of methionine and other essential amino acids.

Evaluating the United States Counterterrorism Strategy Regarding Violent Extremism

Matthew Oldham, CURO Research Assistant
Dr. Dan Silk, Political Science, School of Public & International Affairs

Homegrown violent extremism (HVE) has been perceived as a growing problem in the United States, and community policing has been suggested as an approach needed to address this challenge. This paper provides a metadata analysis of the United States' *Empowering Local Partners* strategy, the United Kingdom's *Prevent* strategy, and articles and

policies to identify growing problems that surround today's model of community policing. Building off existing research, this article will contribute to help academics and policymakers alike, understand the growing issues associated with policing in order to build a better understanding of community engagement programs. The primary areas of focus relate to building relationships with affected communities, identifying homegrown violent extremism, and understanding cultural practices in order to build a more informed police unit.

Investigating the Cell Walls of *Arabidopsis thaliana* Organs using Screenings with Glycan-directed Monoclonal Antibodies and Electron Microscopy

Fatai Olorunsola, CURO Research Assistant
Dr. Michael Hahn, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Plant cell walls are primarily composed of polysaccharides, including cellulose, hemicellulose (e.g., xyloglucan, xylan, and mannan), pectin (e.g., homogalacturonan, rhamnogalacturonan, substituted galacturonans) and arabinogalactans [1]. A large and diverse collection of monoclonal antibodies has been generated that bind to various non-cellulosic polysaccharides present in the primary and secondary cell walls of plants [2]. The cell wall structure and composition can now be explored systematically from the whole plant to the sub-cellular levels because of this large collection of antibodies [2]. However, the complexity of the cell wall has made it difficult to observe the composition of the cell wall [3]. Screenings of wall extracts with cell wall glycan directed mAbs allow for the simultaneous comparative examination of cell walls from larger numbers of samples [2]. The results of such screens can further be used to inform the selection of antibodies to be used for more detailed immunohistochemical studies [2]. The studies described in this paper center on growing Arabidopsis wild type plants, isolate organs, preparing cell walls from the harvested tissues, preparation and screening the cell walls extracts against the monoclonal antibody collection. Each reagent used is able to extract specific portions of the plant cell wall. The experimental plan here is to generate cell wall residues from multiple organs that vary in their structure and make up by treating the wall with specific reagents that remove distinct wall components selectively. The final resulting residues will be examined using scanning electron microscopy (SEM) for understanding the net structural changes.

Analysis of P1 Function in *Mycoplasma pneumoniae* Adherence and Gliding

Babajide Oluwadare, CURO Honors Scholar, CURO Summer Fellow, CURO Research Assistant
Dr. Duncan Krause, Microbiology, Franklin College of Arts & Sciences

This study focuses on *Mycoplasma pneumoniae*, a human pathogen causing bronchitis and primary atypical, or "walking" pneumonia. Mycoplasma adherence to respiratory epithelium is mediated by a differentiated terminal organelle. Located on the surface of the terminal organelle is the P1 protein, which functions directly in both cell adherence and motility. There is evidence from recent studies to indicate that P1 repeatedly catches and releases sialic acids, present on airway cell surfaces, to thrust the mycoplasma cell forward. Furthermore, P1 is believed to exist in conformationally distinct subpopulations that shift when mycoplasma cells glide. Little is known about the specific mechanism by which the bacterium exhibits motility via the P1 protein. Learning about this unique form of movement can lead to new strategies for treatment of infections and a greater understanding of bacterial motility. By means of immunofluorescence microscopy with

monoclonal antibodies specific for P1, mAB1 and mAB2, we sought to define quantitatively the location and relative amounts of P1 subpopulations. The antibodies mAB1 and mAB2 consistently yielded distinct labelling patterns, which were not the result of background or "noise." Furthermore, mAB1 appeared to bind only to a subset of P1 proteins and only at specific times, as opposed to mAB2, which appeared to bind to all P1 at all times.

Analysis of the Effects of High-Fat and Low-Fat Diets on Blood Lipid Profiles

Maria Orlando, CURO Research Assistant
Dr. Brian Cummings, Pharmaceutical & Biomedical Sciences, College of Pharmacy

Obesity is the condition of containing excess body fat and is a risk factor for many diseases. It can be induced by various stimuli such as high-fat diet. We used lipidomics to test the hypothesis that fat content in the maternal diet affects the phospholipid profiles of offspring. To determine these changes we extracted phospholipid from whole blood of mothers fed high-fat and low-fat diets and also extracted phospholipid from the blood of their offspring. These samples were analyzed using electrospray ionization-mass spectrometry, followed by multivariate analysis, which allowed us to identify differences in the phospholipid profiles between groups. As expected, mothers fed a high-fat diet for six weeks had significant differences in their blood lipid profiles as compared to those fed a low-fat diet for six weeks. Interestingly, we also observed significant differences in the phospholipid profiles of female offspring of high-fat diet fed dams and low-fat diet fed dams. Statistical analyses will be performed to identify significantly altered lipid species, followed by the tentative identification of these species using mass spectrometry. The current data suggest that diet can affect blood lipids and could serve as a precursor for obesity-related disease states in offspring. These findings will ultimately allow us to better understand the effects of parental diet on offspring's lipidome.

Investigating Macular Pigment Optical Density in Pregnant Mothers during Prenatal and Postnatal Stages

Mallory Osborne, CURO Research Assistant
Kaitlyn Barrow, Selena Soviravong, Kayla Patel, Rosie White, Katelynn Porto, Noopur Luthra
Dr. Janet Frick, Psychology, Franklin College of Arts & Sciences

The carotenoids lutein (L) and zeaxanthin (Z), which are obtained via diet (e.g., green leafy vegetables), accumulate in the central retina where they are referred to as macular pigment. Macular pigment optical density (MPOD), a measurement of L and Z in the retina, has been positively correlated with adult cognition and visual functioning (e.g., processing speed; Bovier et al., 2014). During prenatal development, L and Z are deposited in the fetal retina in high concentrations (Bone et al., 1988), and lutein is the predominant carotenoid in infant brain tissue, despite comparatively low dietary intake from mature breastmilk (Vishwanathan et al., 2011; Hammond, 2012). These discoveries have led to the idea that L and Z are actively transported to fetal and infant neural tissue, perhaps being taken from maternal tissue stores (e.g., macular pigment) to meet the developing infant's nutrient demands when maternal dietary intake is insufficient (Hammond, 2012). The current study examines women's MPOD, measured with a Macular Densitometer™ (Wooten et al., 1999), and dietary intake of foods containing L and Z, during pregnancy and postpartum to see if maternal MPOD changes over the course of pregnancy and early breastfeeding. We predict that MPOD will decrease across pregnancy, with dietary intake of L and Z moderating the slope of the decline. These

findings could have significant implications for prenatal dietary recommendations in order to maintain optimal health for both mother and infant.

The Effects of Lutein and Zeaxanthin on Cognitive Function and Neural Efficiency in Older Adults with and without Cognitive Impairment

Meredith Osborne, CURO Summer Fellow, CURO Research Assistant
Dr. Lisa Renzi, Psychology, Franklin College of Arts & Sciences

Low levels of circulating dietary carotenoids lutein (L) and zeaxanthin (Z) and low macular pigment optical density (MPOD, or L+Z levels in the neural retina) have been associated with increased risk for neurodegenerative diseases such as age-related macular degeneration (AMD) and Alzheimer's disease (AD). L and Z serve a number of functions *in vivo*. For example, L and Z have anti-inflammatory properties and are antioxidants. Consequently, L and Z, in high concentration, might protect metabolically active neural tissue from oxidative stress and inflammation known to cause neurodegenerative disease. L and Z also influence formation of gap junctions and, as a result, might influence neural efficiency. The protective hypothesis has been tested previously, but the neural efficiency hypothesis has not been widely tested. In order to test the neural efficiency hypothesis, 100 adults between 18-92 years of age were tested. Serum L+Z, MPOD, cognitive function, temporal visual function, and neuroimaging measurements were conducted at baseline and, for most measurements, at 4-month intervals over the course of one year. Participants were given either a lutein supplement (12 mg / day) or placebo, and both participants and experimenters were masked to treatment type. Although the study is ongoing, the purpose of the current sub-study is to examine the relationships between processing speed, baseline L+Z levels and speed-based cognition measures in healthy adults. It is predicted that individuals with higher serum L+Z and MPOD will have improved processing speed at baseline relative to other healthy adults with low L+Z levels, indicating improved neural efficiency.

Do Non-Native Apple Snails Feed Preferentially on Non-Native Aquatic Plants in Lake Seminole, Georgia?

Jack Owen
Dr. Alan Covich, Odum School of Ecology

Invasive species are increasingly affecting natural communities and creating novel food webs. The first species to invade Lake Seminole in Georgia was *Hydrilla verticilata,* which dominated the submerged vegetation. More recently, the "giant apple snail", *Pomacea maculata*, was found to be widespread around the lake's shoreline. These large snails, native to South America, are known as voracious herbivores. Their appetite has made them a species of concern to both ecologists who study the lake's ecosystem and recreationists who use the lake for fishing and boating. Many speculate whether the snails will help control the *Hydrilla* problem or if they will consume other less dominant, non-native plants such as water hyacinth (*Eichhornia crassipes*), that float on the lake's surface near shore. To test the hypothesis that the apple snails would not selectively consume one plant species more than another, I fed two sizes of snails three different types of food: romaine lettuce (control), *Hydrilla* and *Eichhornia*. I measured how the snails' body masses and shell sizes responded to the different types of food they ate. While preliminary studies had suggested that snails would grow fastest when fed water hyacinth, other literature suggested that the snails do not prefer water hyacinth. My study found that snails fed *Hydrilla* grew at a faster rate than did snails fed either lettuce or *Eichhornia*.

Abstracts

Using Environmental DNA to Detect and Track Dispersal of the Island Apple Snail Invasion in Lake Seminole, Georgia

Jack Owen
Dr. Alan Covich, Odum School of Ecology

One of the challenges in determining the dispersal of species in an aquatic ecosystem is the need for direct observation. This project seeks to utilize the novel method of environmental DNA (eDNA) analysis to map the dispersal of the island apple snail, *Pomacea maculata*, in Lake Seminole of southwestern Georgia. Typically, the snails' large egg masses are considered an approximation of dispersal. To validate this assumption, water samples were taken at sites containing a range of egg mass abundance. Water samples were then filtered at the lake, preserved, and transported to the University of Georgia for analysis. DNA was extracted from the samples, and then amplified via polymerase chain reaction (PCR). Primers used in PCR ensured that only a 650 base pair strand of the snail's cytochrome c oxidase subunit I, or COI, was amplified. This segment of mitochondrial DNA is the one generally used as a DNA "barcode" when identifying animal species. Gel electrophoresis was then performed on each sample to confirm the identity of source DNA. While we hypothesize that we will find DNA in the samples from areas where apple snails have been observed, we also expect that apple snail DNA will be amplified in at least some of the samples from areas where apple snails were not directly observed. These findings will provide greater information on the range of apple snails in Lake Seminole and help track patterns of dispersal into nearby lakes and wetlands, hopefully serving as a means of "early detection" of an invasion.

Vocal Repertoire and Call Structure of Red-and-Green Macaws (*Ara chloropterus*)

Joel Owen, CURO Summer Fellow
Dr. Dorothy Fragaszy, Psychology, Franklin College of Arts & Sciences

The behavioral biology and vocal repertoire of Red-and-green Macaws (*Ara chloropterus*) are virtually unstudied in the wild, with only one known study (Schwob et al., unpublished). Our objectives for this study were three-fold: to document the repertoire of the Red-and-green Macaw and analyze call structure; to match vocalizations with behavioral patterns to gain insight into call function; and to compare calls with those of the Blue-and-gold Macaw (*Ara ararauna*). The study area was in the Cerrado of Brazil on Fazenda Boa Vista (FBV), a privately-owned property. Data collection occurred between May 2014 and July 2014 and involved opportunistic audio recording. A total of 177 recordings were made, yielding 111 processed calls. Vocalizations were processed using Audacity and SoundRuler software. To analyze the calls, several structural and temporal parameters were used: duration, dominant frequency, maximum and minimum fundamental frequency, and frequency band. We categorized vocalizations as *flight* (shorter duration; frequency modulation) or *alarm* (longer duration; no modulation) depending on the parameters. Statistical analysis of the data involved principal component analysis (PCA) and discriminant function analysis (DA). A total of 37 *A. chloropterus* calls and 36 *A. ararauna* calls were tested in the PCA and DA. Preliminary results show that the three temporal components explain 75.4% of the variation of all variables. The DA is currently ongoing to determine which parameter discriminates between the calls of each species. Structurally, *A. chloropterus* vocalizations appear to be noisier and contain less structural bands than those of *A. ararauna*.

Theatrical Imagery in Nabokov's *Invitation to a Beheading*

Meredith Paker, Foundation Fellow, CURO Research Assistant
Dr. Charles Byrd, Germanic & Slavic Studies, Franklin College of Arts & Sciences

The Russian-American author Vladimir Nabokov calls his 1935 work *Invitation to a Beheading* his "dreamiest and most poetical novel" for which he has "the greatest esteem" (*Strong Opinions,* 76, 92). The mysterious Cincinnatus C. has been convicted of "gnostical turpitude" and awaits his execution in torment in an atypical prison setting. To many readers, *Invitation to a Beheading* is an abstract work of art, aesthetically beautiful but thematically abstruse. However, by analyzing the theatrical imagery of the surreal execution scene, the theme of "all the world's a stage" emerges. The imagery Nabokov uses in this scene includes the doubling of two characters, the portrayal of the executioner as a larva, and the falling of two-dimensional trees. When Cincinnatus realizes the unsubstantiality of this theatrical world, he divests himself of it and causes its collapse.

The Welfare Effects of Off-Label Prescriptions

Meredith Paker, Foundation Fellow
Dr. Jonathan Williams, Economics, Terry College of Business

Though the FDA restricts the marketing of a drug to its set of FDA-approved "on-label" uses, physicians can prescribe any prescription drug for any condition. Many prescription drugs are prescribed "off-label" because it is costly for pharmaceutical companies to get new uses of existing drugs FDA-approved. These off-label prescriptions have potentially desirable effects if they allow for the best treatment of a patient's condition or if they permit innovative new uses of safe drugs. However, off-label prescriptions could be undesirable if they become wasteful or if they cause patient harm. Little is known about which populations receive off-label prescriptions and whether the potential benefits to patients from off-label prescriptions outweigh the costs. We find that about thirty percent of prescriptions are for off-label uses, and our results suggest that off-label prescribing may enhance patient welfare, motivating a deeper welfare study. We combine the U.S. government's Medical Expenditure Panel Survey data on doctor visits and prescription records with yearly Physician's Desk Reference data on the conditions each drug is FDA-approved to treat to identify off-label prescriptions. Determining the welfare effects of these prevalent and controversial off-label prescription practices will add an important dimension to the national policy conversation regarding the FDA's regulatory environment.

Reducing the Disparity between Federal Sentencing of Crack and Powder Cocaine

Bailey Palmer, Ramsey Scholar
Mallika Madhusudan, Foundation Fellow
Dr. Linda Renzulli, Sociology, Franklin College of Arts & Sciences

Federal sentencing for crack cocaine has been one of the greatest sources of inequality and racial discrimination in recent years. Though the 2010 Fair Sentencing Act reduced the 100:1 sentencing disparity between the pharmacologically identical crack cocaine (usually found in lower income neighborhoods with large minority populations) and powder cocaine (typically used by affluent Caucasians), there remains continual discrimination within federal sentencing structures. Current FSA policy has changed the sentencing disparity between crack and powder cocaine to 18:1 though the drugs' similarities suggest a 1:1 sentencing ratio would be more appropriate. Furthermore, though reduced crack penalties were made retroactive, alterations to

mandatory minimum legislation were not made retroactive. This means thousands of offenders remain in prison under excessive, outdated sentences. According to Michael Nachmanoff, a federal defender for Virginia, "A person with crack will have to have 28 grams before triggering a mandatory 5 year minimum sentence. But the person with powder cocaine must still have a much larger amount – at least 500 grams." Our policy would implement a 1:1 sentencing ratio for both powder and crack cocaine and second, remove mandatory minimum restrictions that prevent retroactive sentence reductions. Though there have been some proposed policies to fix the residual issues in federal cocaine sentencing such as Rep. Bobby Scott's proposed House Bills and Smarter Sentencing Act as proposed in the 113th Congress, none of these policies have passed. There are currently no sentencing bills introduced in the current 114th Congress.

Democratic Institutions and the Human Right to Health

Eytan Palte, Foundation Fellow
Dr. K. Chad Clay, International Affairs, School of Public & International Affairs

The human right to health is enshrined in various human rights regimes, first appearing in the 1948 Universal Declaration of Human Rights and further elaborated upon in subsequent conventions. Despite these guarantees, there is a disparity between what is enshrined in international law and what is effectuated by governments worldwide. Although this gap can be attributed to various factors, this paper focuses specifically on how differences in democratic institutions affect the enjoyment of this human right. Previous research has demonstrated that certain democratic institutions lead to more representative governments, while other institutions yield more accountable ones. We predict that a nation's healthcare system will be related to the degree of representativeness incentivized by its state's electoral institutions, while the effectiveness of those systems for the covered populations will vary according to the incentive for accountability. We will test these hypotheses using quantitative data sets on healthcare systems and comprehensive indicators of health outcomes in democracies.

Using the Chemical Reporter Strategy to Analyze Glycoproteins in Pompe Disease

Sora Park, CURO Summer Fellow
Dr. Richard Steet, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Lysosomes are organelles within cells that help degrade macromolecules so that precursors such as amino acids and sugars can be recycled and reused by the cell. Lysosomal Storage Diseases (LSDs) have some type of abnormal lysosomal storage, and it is likely that this storage causes altered storage or recycling of glycoproteins. Using a chemical reporter strategy employed previously for Niemann Pick Type C disease, we will test this possibility by studying Pompe disease (PD), an LSD characterized by the storage of glycogen within lysosomes. Our initial experiments will focus on the visualization of glycoprotein storage using microscopy- and biochemistry-based methods. Confirmation of storage would lead to the development of technology that would allow isolation and identification of the glycoproteins that accumulate inside the cell. Discovering the identity of the stored glycoproteins would be greatly insightful to their pathological roles in in LSDs. This work could potentially lead to a clarification of the pathophysiology of not only Pompe disease and Niemann-Pick disease, but of LSDs in general. A better understanding of how storage leads to impaired movement of other molecules in the cell will hopefully lead to the development of more effective therapies.

Tea Polyphenols Inhibit Activity of Pancreatic Lipase

Sungwhan Park, CURO Research Assistant
Xiaoping Yang, Key Laboratory of Horticultural Plant Biology, Huazhong Agricultural University, Wuhan, China
Dr. Fanbin Kong, Food Science & Technology, College of Agricultural & Environmental Sciences

The purpose of this research was to investigate the effect of tea polyphenols, found in green tea, on pancreatic lipase activity under *in vitro* conditions. Porcine Type II pancreatic lipase was dissolved in ultra-pure water to make 0.5 mg/mL solution. The lipase solution (100 μL) was mixed with 450 μL of 0.02% (w/v) pNP laurate substrate, 350 μL of pH 7.2 Tris buffer, and 100 μL tea polyphenol solution with concentration ranging from 0.1 to 1.0 mg/mL. Control was prepared by using the same amount of lipase and substrate but with 450 μL buffer. The control and sample mixtures were incubated in a water bath at 37°C for 2 hours, and the mixtures were then analyzed in a spectrophotometer with wavelength at 400 nm. The result showed that tea polyphenols inhibited the lipase activity. The inhibition increased with tea polyphenol concentration, and reached maximum at concentration 0.5 mg/mL, where pancreatic lipase activity was reduced by 47.83%. The reduction in lipase activity was 2.38%, 15.24%, and 37.77%, for tea polyphenol concentration of 0.1 mg/mL, 0.25 mg/mL, and 1.0 mg/mL, respectively. It has been known that drinking green tea helps reduce the risk of obesity and cardiovascular disease. This study indicated that the enzyme inhibition may be part of the mechanism. The result also confirmed that green tea could be used as a natural medicine to reduce the risk of these diseases.

Rolling the Dice: The Economic Impact of Casinos

Davis Parker, Foundation Fellow, CURO Research Assistant
Dr. David Mustard, Economics, Terry College of Business

Over the past 30 years, the prevalence of casinos and legal gambling has skyrocketed across the United States as state legislatures have begun granting casino licenses to Native American tribes and private corporations in mass. Seen as a means for greater employment, tourism, and development, these new casinos offer a bouquet of gambling opportunities such as blackjack, slots, poker, dog racing, and bingo. Yet, definitive conclusions on the efficacy of casinos in creating economic prosperity have often evaded researchers. Using data from the Bureau of Labor Statistics as well as a homemade dataset of casino start and closing dates, we study the economic impact of casinos. Applying high-level data analytics, we identify the intertemporal effects casinos can have on establishment counts, levels of employment, and wage rates. Additionally, we examine how these effects vary across counties by population size and region. We hope that our research will better inform policy makers at the national and local levels in their deliberations on the consequences, both positive and negative, of licensing casinos.

UGA Employee-Benefit and Retirement Preparedness

Jessica Parks
Dr. Heidi Ewen, Institute of Gerontology, College of Public Health

The purpose of this study is to understand the ways in which UGA employees make decisions regarding their available retirement planning options. Retirement preparedness and the financial confidence of UGA employees has much room for exploration. With changes in social security benefits and employee-based investing plans, the need for

retirement preparedness is even more important for the financial well-being of UGA employees. I am recruiting employees who are eligible for UGA's two retirement options (the Teacher's Retirement System and the Optional Retirement Plan). They will be asked to complete an online survey of questions related to their financial planning and anticipated retirement needs. Their responses will be recorded in a database, coded for security and then analyzed. Data will be analyzed using mixed methods, qualitative and quantitative, testing for relationships among age, employment type, gender, marital status, family size, religious affiliation, political ideation, health, and future plans. Data collection is still in progress.

Understanding Floral Trait Evolution in Wild Sunflowers

Hiral Patel, CURO Summer Fellow
Dr. Lisa Donovan, Plant Biology, Franklin College of Arts & Sciences

To predict crop and wild species' reproductive success and persistence under looming environmental changes, we must understand how floral traits are adapted to specific climates. This project investigates ecological and evolutionary causes of variation in floral traits across the genus *Helianthus*. Thirty species of wild sunflowers were grown using common garden techniques to assess an evolutionary trade-off between investment in pollinator attraction and seed production. The evolutionary strategy adopted by specific species under this trade-off is hypothesized to be affected by differences in life history and environmental factors. It is hypothesized that annuals will invest more in attraction as they get one chance to reproduce, compared to perennials which are expected to invest less in attraction because they have many opportunities to reproduce over their multi-year lifespan. Investment in attraction and flower size will decrease in hotter, drier environments in order to avoid water loss. Investment in attraction and flower size will decrease as soil fertility decreases to conserve resources. Evolutionary statistical analyses such as ancestral state reconstruction and phylogenetically independent contrasts will be performed to determine which traits are evolutionarily conserved and which are labile and potentially adaptive. Understanding trade-offs in floral biomass allocation has ecological consequences. Species adapted to specific environments may be unable to adapt to changing conditions under the short time scales of current climate change and could be threatened by the increasing frequency of droughts due to water loss from investment in large attractive petals, which are not able to control water loss like leaves.

Expression and Purification of PRMT1 and Mutant Variants

Viral Patel, CURO Research Assistant
Dr. Y. George Zheng, Pharmaceutical & Biomedical Sciences, College of Pharmacy

Epigenetics involves cellular and physiological traits that are heritable by conceived generations in a manner that is independent of the core DNA sequence. It has often been observed that many pathological conditions and malignant tumors have an epigenetic basis for disease onset (Yang, Bedford, 2013). In the post-genomic research era, epigenetic processes are proving to be increasingly important as scientific data accumulates. One key epigenetic process involves remodeling of chromatin to regulate gene expression. Post-transcriptional modifications such as methylation, acetylation, or phosphorylation of histone tails change chromatin stability and alter the binding of transcription factors (Zhang et al., 2013). Histone modifying enzymes, such as PRMT1, can methylate residues in histones to either reduce OR sometimes increase its gene expression. PRMT1 specifically methylates guanidine nitrogens of arginine residues in certain histones. Understanding the regulatory factors

of such chromatin remodeling complexes, along with their specificity and functional roles are critical for further understanding of disease association with epigenetics. In order to perform such studies, the enzymes involved themselves must be expressed or generated for further experimentation. Using standard molecular biology techniques, PRMT1 was expressed multiples times, along with mutant variants. The goal was to improve yield and purity of the obtained protein. The model organism *Escherichia coli (E. coli)* was used to conduct the experiments. Specifically, the BL21(DE3) strain was used due to the several biotechnological advantages, such as lower acetate yield and a higher biomass, which are beneficial for protein production, the overall goal of the experiment (Waegeman et al., 2011). The BL21(DE3) *E. coli* were transformed with the pET28b+ plasmid, which contains the genetic code for histidine-6x-human-PRMT1 (his-6x-h-PRMT1), Kanamycin resistance, and the lacl repressor protein. A sample of the *E. coli* were inoculated in Kanamycin and Lysogeny broth (LB) media and further incubated for growth at 37° C until the proper optical density (OD) was reached. Isopropyl β-D-1-thiogalactopyranoside (IPTG) was added to initiate transcription and translation of his-6x-h-PRMT1. After approximately 16 hours of incubation, post-IPTG addition, the BL21 cells were collected from their media using centrifugation. The collected cells were suspended in *Cell Lysis Buffer* and then disrupted. After further centrifugation, the resulting supernatant contained the recombinant protein. Using Nickel (Ni) beads in purification columns, the protein was collected. The isolated PRMT1 was aliquoted and stored at -78° C after it was concentrated using dialysis and centrifugation through a filter membrane. Bradford assay and sodium dodecyl sulfate-polyacrylamide gel electrophoresis (SDS-PAGE) of the protein and purification column samples were conducted to test for the purity and quality of the expressed protein.

Folic Acid Knowledge and Use among Participants of a Community-Based Intervention Study in Pregnant Women

Meagan Patterson, CURO Research Assistant
Dr. Dorothy Hausman, Foods & Nutrition, College of Family & Consumer Sciences

Periconceptional supplementation with folic acid is an important public health recommendation aimed at reducing the risk of neural tube defects (NTDs). Unfortunately, many women may be unaware of this recommendation or fail to follow it before becoming pregnant. To determine the extent of folic acid knowledge and use and potential factors influencing use, we conducted a secondary analysis of baseline data collected as part of an on-going folic acid supplement intervention study in pregnant women. Select data were extracted from medical records and baseline health behavior questionnaires of study participants (n=31, age range=20-37, 55% White, 16% African American, 29% Hispanic) for which information on age, race, parity, and marital status, prior folic acid knowledge, source of knowledge, and multivitamin use before and in early pregnancy, were available. Chi-square analysis was used to determine prevalence of folic acid knowledge and use by demographic and lifestyle factors and logistic regression was used to estimate predictors for multivitamin use before pregnancy. Results showed that although 87.1% of participants had heard of folic acid, only 45.2% took multivitamin supplements prior to pregnancy. Regression analysis indicated that older age (age≥28, P=0.028) and being married (n=14, P=0.0463) were significant predictors of periconceptional multivitamin use while race, parity, and prior folic acid knowledge were not. All married participants and 28.6% of single participants reported taking multivitamin supplements during early

pregnancy. Although this was a small study, the results indicate that public health recommendations for periconceptional folic acid intake need to be reinforced, particularly among younger, sexually active single women.

Investigating Invertebrate Utilization of Bryophytes in a Mid-Order Piedmont River

Meryom Pattillo
Dr. Mary Freeman, Odum School of Ecology

Over the past few decades anthropogenic effects on stream structure and function have been increasingly studied, particularly concerning in-stream and out-of-stream water needs in relation to flow regulation. Human-driven impacts resulting from abstraction of surface water can drastically alter stream structure and function, especially pertaining to plant assemblages. One such group of plants are the bryophytes consisting of mosses, liverworts, and hornworts. Bryophytes inhabit both terrestrial and aquatic systems but little is known about their function in riverine ecosystems. Bryophytes offer excellent habitat for aquatic macroinvertebrates because they provide food through captured organic matter and offer protection from predation through their chemical defenses. This study focused on assessing aquatic macroinvertebrate utilization of bryophytes on rock outcroppings in a piedmont sand bottomed river. Bryophyte samples were collected from the Middle Oconee River near Athens, GA where submerged samples of the bryophyte *Porella* as well as other bryophytes were collected from rocks and trees trunks. We predicted a higher density of macroinvertebrates in bryophyte mats compared to literature values for other common invertebrate habitats and a significant difference in invertebrate biomass and diversity between different species of bryophytes. This research is important because it provides insight into a poorly understood yet widespread macroinvertebrate habitat. Furthermore this research has implications for riverine management and conservation practices because flow regulations preventing inundation of riverine bryophytes could negatively affect macroinvertebrate habitat availability.

Do You Know Why 6 - - 2 Is the Same as 6 + 2?

Andrew Peake, CURO Research Assistant
Dr. Jessica Bishop, Math & Science Education, College of Education

How do 7th and 11th grade students think about subtracting negative numbers? As a field, we do not know much about students' understanding of integers. When compared with research on rational numbers or place value, the research on students' understanding of integers is relatively sparse (NRC, 2001). We interviewed forty 7th graders and forty 11th graders to better understand how they thought about integer arithmetic. We investigated their success and underlying reasoning when solving integer subtraction problems. We found that although most 7th and 11th graders could correctly solve integer subtraction problems, over 70% of the students could not explain why their procedures worked. The majority of students initially changed subtractions problems like 6 - -2 = __ to an equivalent addition expression using rules or procedures like "keep-change-change" (keep the sign of the first number, change the operation, and change the sign of the second number).

Differential Consumption of *Eurypanopeus depressus* When Infected by *Loxothylacus panopaei*

Sarah Perry
Dr. Jeb Byers, Odum School of Ecology

Populations of the mud crab *Eurypanopeus depressus* are often heavily infected with the parasite *Loxothylacus panopaei*, a castrating barnacle parasite. To determine if the

predators differentially preyed upon infected or healthy mud crabs, we conducted a tethering experiment on Skidaway Island in summer 2014. Healthy mud crabs were paired with infected mud crabs, and the pairs were interspersed on tethers along an oyster reef in the intertidal zone. We deployed the crabs during low tide and collected them during the following low tide (approximately 12 hours of exposure). We conducted a total of five nighttime and three daytime trials. Infected *E. depressus* were consumed at a significantly higher rate than uninfected *E. depressus* during the nighttime trials. There was no significant difference between infected and uninfected *E. depressus* during the daytime trials. We conducted a literature review to determine which nocturnal predators could be driving the observed predation differential and found that the red drum (*S. ocellata*), Chesapeake blue crab (*C. sapidus*), pinfish (*L. rhomboids*), and grey snapper (*L. griseusi*) are likely contributing. Parasitic infection is apparently making *E. depressus* a more enticing prey target, and its consumption could reduce prevalence of *L. panopaei* reducing its spread.

The Impacts of Iron Deficiency Anemia on Mitochondrial Capacity

Kelly-ann Peters, CURO Research Assistant
Joanna Szymonik
Dr. Kevin McCully, Kinesiology, College of Education

Iron deficiency anemia is the most common blood disorder and nutritional deficiency in the United States. General fatigue and weakness often accompany this deficiency and can greatly impair overall work capacity and athletic performance. The primary aim of this study is to determine if iron deficiency impacts the function of skeletal muscle mitochondria, the organelle responsible for producing energy in the cell. Ten participants with a known history of iron deficiency anemia will be observed in this study. Each participant will be matched to a control in order to best compare results (20 participants total). Hematocrit and hemoglobin levels will be measured in each participant in order to determine iron deficiency status and severity. Mitochondrial capacity will be measured with near-infrared spectroscopy using the recovery rate of muscle oxygen consumption after a short bout of exercise of the brachioradialis muscle in the forearm. Metabolic rate will be measured as the slopes of the HHB, HbO2, and HbDiff during short duration arterial occlusions. We hypothesize that iron deficient anemic individuals will show a lower mitochondrial capacity in their skeletal muscles compared to a matched control. The establishment of the relationship between iron deficiency status and mitochondrial function can provide information to guide future studies to improve the health in people with iron deficiency anemia.

Spoken Word Activism in the Age of Social Media

Sonja Petrovic
Dr. Chris Eaket, Theatre & Film Studies, Franklin College of Arts & Sciences

With the rise of social media, there has been an increase in the popularity of spoken word. Spoken word has evolved to mean performance-based poetry that is usually socially-aware and centered around identity politics. Although social media has often been considered "slacktivism," spoken word generally attempts to show and educate the audience about how dominant, oppressive systems function to privilege certain groups over others. It is with the help of YouTube, Twitter, and Facebook that organizations such as Button Poetry (over 300,000 subscribers) as well as individual and group performers are able to reach such large audiences. This presentation explores the history of spoken word, starting in the Harlem Renaissance (within the frame of Black Activism) and moving onward into other identity politics. bell hooks's theory of language as a site of

resistance states that one can choose and vocalize their space in the margins in order to resist; applying this theory, this presentation states that spoken word poetry brings social justice issues and systems of inequality to light and actively resists them. Spoken word plays with and blurs the conventions between the narrator and author by having the speaker adopt a persona and speak either genuinely or ironically. This allows them to critique societal values and power structures by using everyday experiences while simultaneously remaining at a distance. Spoken word has navigated the difficulties of social-media culture and become a form of activism that's accessible. It stands to have an unprecedented impact in the social media era.

Analyzing Persistent Organic Pollutants in the Tissue of Stranded *Tursiops truncatus* along the Coast of Georgia, USA: Effects of State of Decomposition and Stranding Location

Tabitha Phillips, CURO Research Assistant
Dr. Susan Wilde, Warnell School of Forestry & Natural Resources

Tissue samples are collected from stranded bottlenose dolphin (*Tursiops truncatus*) from the Georgia coast annually by the Georgia Department of Natural Resources. Blubber samples from stranded dolphins were analyzed (n=12) for a suite of persistent organic pollutants (POPs) which include: PCBs, PBDEs, and other organochlorine pesticides (OCPs) with the goal of determining the relationship between state of decomposition and stranding location on contaminant load. Skin samples (n=11) were also analyzed for total mercury (THg). No statistically significant differences were found between POP class and the state of decomposition. Significant differences were found between Aroclor 1268 proportion and stranding location. A positive correlation was found between total body length and THg concentration in skin (R2=0.5576).

Closing the Achievement Gap: Elementary Second Language Education in Philadelphia Schools

Laura Pontari
Dr. Gary Green, Warnell School of Forestry & Natural Resources

Research was conducted to formulate a policy proposal for an elementary bilingual education program in the School District of Philadelphia (SDP.) The goal of this policy is to improve the quality of education provided by the SDP without putting additional strain on its already-failing budget. The project outlines a program that establishes a partnership between the SDP and local public universities in Philadelphia to provide qualified college students as assistant teachers for second language education programs in the SDP. To address the rapidly increasing Latino population, the program would provide second language instruction in Spanish to elementary students from Kindergarten through third grade. This program gives college students in local education programs practical experience, and exposes elementary students to Spanish vocabulary and basic grammar to create a basis of knowledge for further fluency.

Controlling Contamination of Algal Grazers Using Nitrogen Sources

Grace Power
Dr. Manjinder Singh, College of Engineering

Microalgae biofuels answer the current need for new and sustainable energy sources. Before algae biofuels can become mainstream, however, production of fuel must become more cost effective. Currently, biomass yields are threatened by algal grazers. Ciliate and rotifer populations are commonly controlled by pesticides, but alternate nitrogen sources may offer a safer and cheaper substitute. This experiment introduced grazer control using Poultry Litter Extract and Ammonium bicarbonate. Two algal strains *Chlorella*

sorokiniana (Cs) and *Chlorella minutissima* (Cm) were grown in 250 mL flasks and inoculated with ciliate and rotifer populations. Three treatments of growth medium supplementation were tested for each strain; Ammonium bicarbonate (100mg/L Nitrogen), 5% Poultry Litter Extract (PLE) and control grown in standard BG11 medium. Algal growth, and Ciliate/ rotifer populations were monitored at regular intervals. The average growth rate in both strains in control treatment was negative. The ciliate growth rate was 1135 and 528 ciliates/d in *Cs* and *Cm* respectively. Ammonium bicarbonate treatment eliminated grazers completely; however, algal growth rate was also lower relative to control. In PLE, grazers' population declined by an average 52 and 86% in *Cm* and *Cs* respectively during five days incubation. However, algal growth was also negatively impacted by 5% PLE. Further studies with longer incubation periods are being carried out to evaluate algae recovery from high nitrogen shock and achieve net positive growth after grazers' elimination.

The Impact of Rest and Game Location on NBA Team Performance

Steven Pugh, Mckenzie Benson, Rebecca Gaines, Mary Catherine Kelley
Dr. Karl Kuhnert, Psychology, Franklin College of Arts & Sciences

In today's globalized society, travel has become an accepted element of work. However, travel is associated with factors that have the potential to affect performance. Previous research shows a negative relationship between traveling and performance. It has been found that people perform better in familiar environments. Rest has the capacity to counteract the negative effects of traveling. Sports data have been used to analyze these relationships due to the availability of information. For example, the game's home versus away status can be used to measure an unfamiliar environment, point differentials can measure performance, and days rest can objectively measure time between games. For this study, we examined home versus away status and the amount of rest between games using NBA data. We expected that teams playing at an away location would attain less sleep, and therefore away games would amplify the negative impact of lack of rest on performance. Results show that teams performing at away games, who received less rest, performed worse. Teams lost more frequently at away locations than at home. Results support the original prediction of a negative relationship between away game location and performance. Results found from this study can be applied to the work environment by suggesting that managers give employees adequate rest time while traveling. Traveling employees given ample rest time could offset some of the negative effects of travel. Therefore, business managers should allow for recovery time upon arrival at their business trip destination or run the risk of increased exhaustion and decreased performance.

Validation of CRISPR/Cas9 for Genome Editing of Fktn in C2C12 Mouse Myoblast Cell Lines

Vedika Rajasekaran, CURO Research Assistant
Dr. Aaron Beedle, Pharmaceutical & Biomedical Sciences, College of Pharmacy

Dystroglycanopathies are caused by defects in glycosylation of α-dystroglycan. Current *in vivo* research, involving the genes associated with glycosylation, are time consuming, expensive, and do not provide a full understanding of dystroglycanopathy gene functions. Therefore, the purpose of our project is to create genetically modified C2C12 mouse myoblast cell lines, with knockout of dystroglycanopathy gene *Fktn,* using CRISPR/Cas9 technology. C2C12 cells were used because they can be differentiated into rudimentary myotubes in culture to model

skeletal muscle dysfunction *in vitro*. C2C12 cells were transfected with a CRISPR/Cas9 plasmid, including a guide RNA targeting the mouse *Fktn* gene, under different conditions. Transfected cells were selected by Fluorescent Activated Cell Sorting and plated to generate clonal lines. In order to determine if mutations occurred in transfected C2C12 cells, a relevant region of the *Fktn* gene was sequenced. Development of genetically modified cell lines is ongoing. Generation of knockout cell lines in *in vitro* research will enable a better understanding of the genes specific to glycosylation of α-dystroglycan and allow us to discover better therapeutic strategies for dystroglycanopathies treatments.

Surveying *Mycobacterium tuberculosis* Gene Function by Complementation

Ashitha Rajeurs, CURO Research Assistant
Samantha Tucker, Graduate Student
Dr. Russell Karls, Infectious Diseases, College of Veterinary Medicine

Mycobacterium tuberculosis (*M.tb*) is a leading cause of morbidity and mortality in humans. In 2013, *M.tb* caused 9 million new cases of TB disease and 1.5 million deaths. Understanding the physiology and biosynthetic capabilities of *M.tb* bacteria may aid in the development of new drugs and vaccines to fight this global health threat. Coenzyme B12 functions as a cofactor in various metabolic enzymes in a wide range of organisms, but is only made by bacteria and archaea. Coenzyme B12 is a complex molecule requiring over 20 enzymes for its synthesis. The *M.tb* genome has homologs of many B12 synthesis genes; however, coenzyme B12 is not detected in strains grown under standard culture conditions. Either all of these strains have mutations in the B12 synthesis pathway or production of this molecule is only made under specific environmental conditions, such as those found inside a human host. To assay *M.tb* genes predicted to function in B12 synthesis, selected genes were cloned into expression plasmids and introduced into mutants of *Salmonella enterica* (*S.en*) blocked in individual steps of the B12 synthesis pathway. At the submission of this abstract, the first *M.tb* gene assayed has been found to restore B12 production by an *S.en* mutant. This supports that this gene encodes an enzyme with the predicted role in B12 synthesis. Results of all of the genes tested using this type of functional complementation assay will be reported. This work will help elucidate whether *M.tb* encodes functional enzymes for all steps in the B12 synthesis pathway.

Convergent and Divergent Validity of the WISDM-68

Marie Rapoport, CURO Research Assistant
Dr. Lawrence Sweet, Psychology, Franklin College of Arts & Sciences

Despite the well-known dangers, cigarette smoking is still the leading cause of preventable death in the United States. Dependence occurs when an individual is unable to quit or reduce smoking despite adverse consequences. Impulsivity is a key construct in addiction research, but it is multi-faceted and inconsistently measured. Prior research has shown that impulsivity is associated with higher rates of substance abuse and dependence and lower success rates in treatment. However, the association between impulsivity and an individual's motives for substance use has been understudied. In the current study, we will use a battery of behavioral and self-report measure to assess impulsivity (go/no-go, delay discounting, the cigarette purchase task, the UPPS Impulsive behavior scale) and its relationship to nicotine dependence and nicotine dependence motives. To assess dependence and motives we will use the Fagerstrom Test for Nicotine Dependence (FTND), a measure of nicotine dependence, and the Wisconsin Inventory of Smoking Dependence Motives (WISDM-68), a measure

of an individual's motives for smoking. We predict that the motives in the WISDM-68 and FTND will be significantly related to impulsivity with specific motives for nicotine dependence differentially associated with individual measures of impulsivity. These results will help inform understanding of how impulsivity translates into substance use.

Effect of Music on People with Developmental Disabilities during Physical Activity

Caroline Ray, CURO Research Assistant
Dr. Kevin McCully, Kinesiology, College of Education

People with intellectual disabilities (ID) are typically less involved in regular physical activity and unhealthier than people without disabilities. The aim of this study was to investigate the effect of music on the exercise intensity selected by participants with ID. The hypothesis was that participant-requested music would result in higher heart rates during exercise compared to non-specific or no music while walking on a treadmill or while cycling. Six participants with ID enrolled in a wellness program course were recruited and permission of their guardians was gained. Three musical situations were carried out: a control situation with no music, a second general "gym music" situation, and a situation with requested music. Heart rate was recorded while on a treadmill or a stationary bike for each situation in separate trials. Questions were asked after each session regarding enjoyment of the workout. Starting at the same speed each session, participants walked or biked for ten minutes during each trial and were encouraged to control their speed. During the first semester of research, the study proved to be a feasible way for measuring the comparison between exercise intensity and different music conditions. It was determined that 80% of participants were not reaching their individual cardiovascular training zones during physical activity; however, more measurements are needed to complete the study. There appears to be a positive effect of self-selected music on exercise intensity. We feel self-selected music might be an important tool to allow fitness programs to provide health benefits to people with ID.

The Relationship between CEO Risk-Taking Behavior and Employee Attraction and Retention

Shelby Reilly, Adam Lowe
Dr. Brian Hoffman, Psychology, Franklin College of Arts & Sciences

Given the likelihood of today's employees to switch companies frequently throughout their careers, organizations that attract and keep the most talented workers often enjoy a competitive advantage (Ployhart, Weekley, & Baughman, 2006). Additionally, CEO behavior plays an important role in how employees view organizations (Quigley & Hambrick, 2014). Therefore, it is possible that how risky a CEO's behavior is perceived to be can impact employee attraction and retention. However, despite the potential impact of CEO behavior on current and potential employees, the relationship between CEO risk-taking and employee attraction and retention has yet to be examined. To meet this end, this study analyzes the relationship between environmental uncertainty (via risk-taking behaviors) in the workplace and employee recruitment and retention. 155 chief executive officers (CEOs) (N = 155) from various Italian organizations and 493 (N = 493) of their followers completed an online survey of study measures. Study findings show that risk-taking behavior is positively related to employee attraction yet negatively related to employee retention. The differing effects of CEO risk taking on selection and retention can present a challenge to organizations, as the same CEO behaviors are not equally successful in recruiting and maintaining employees. Therefore, these

findings suggest that leader strategies designed to attract workers should differ from strategies designed to retain workers. More specifically, leaders should highlight their risk-taking behaviors when recruiting employees, but downplay them during their day-to-day interactions with current workers.

College Students' Credit Experience and Behavior

Anthony Reyna, CURO Honors Scholar
Dr. Brenda Cude, Financial Planning, Housing & Consumer Economics, College of Family & Consumer Sciences

Credit reports provide a very specific window into a person's behavior and experience, and for two and a half years this project has been observing the "windows" of college students. The purpose of this research is to better understand college students' credit experience and their credit behavior based on their credit reports. The credit report data was gathered from University of Georgia students enrolled in the "Money Skills for Life" course (FHCE 3110) from 2008-2013. Credit experience was measured in four ways – whether the student used credit (binary variable measured as 1 if the student's credit report consisted of any accounts attached to their name, zero otherwise), the ownership of the credit (a binary variable measured as 1 if the student had individual ownership of at least one credit account, zero otherwise), the debt-utilization ratio (the ratio of a student's total current balances to his/her total available credit), and a student's total number of open credit accounts. We used Microsoft Excel to build and analyze the dataset and partnered with a graduate STAT course for important findings. A deeper understanding of the relationship college students have with the credit system will help shape course content and effectively present the best practices for credit management to college students.

The Evolution of Quail Hunting Attire in South Georgia and Northern Florida

Lucille Reynolds, CURO Research Assistant
Dr. Katalin Medvedev, Textiles, Merchandising & Interiors, College of Family & Consumer Sciences

The story of quail hunting is an important part of Southern heritage that has not been documented in depth. Formalized quail hunting first gained popularity in the region when wealthy northern industrialists migrated south to purchase vast, bankrupt farms to create sporting plantations for winter vacationing. With their arrival, the dress and kit of quail hunters became more practical, suited to the rough, briar-laden environment. The objective of the project was to identify a timeline of the evolution of quail hunting dress, which includes snake-proof boots, briar britches, safety vest with numerous pockets, and a hat with brim to shade the eyes. To collect data field research was conducted through attending quail hunts, visiting historic locations where quail hunting used to be practiced, face-to-face interviews with quail hunters, and the review of available published materials. The traditional plantation hunting culture has influenced contemporary dress practices by borrowing hunting and shooting features, accents, and materials from the traditional quail hunting attire. Prestige brands, such as Barbour and Orvis, are today staples in non-hunters' wardrobes who seek association with the distinct dress of quail hunters. Although changes in agricultural practices depleted the wild quail population in the region, conservation efforts by organizations such as Tall Timbers Research Station & Land Conservancy offer hope for the preservation of the quail hunting tradition and the wild lands that foster it. They will likely keep its dress traditions alive as well because they are associated with status and convey nostalgia for a disappearing lifestyle.

Abstracts

Nostalgia Inverted: The Golden Age Motif in Strepsiades' Pre-Dramatic History

Elizabeth Ridgeway, CURO Research Assistant
Dr. Charles Platter, Classics, Franklin College of Arts & Sciences

K.J. Dover sketches the protagonists of Aristophanic comedy as figures of opposition who jeer against social custom, myth, public figures, and "all those who in one way or another are superior to [them]selves" (Dover, 1974, p.19). My research applies Dover's claim to lines 43-5 of *Clouds*, positing that, on the one hand, Strepsiades' narrative of his own "*ἥδιστος βίος*" (p. 43) reflects the longing for a prehistoric Golden Age manifest in traditional Greek thought. On the other hand, Aristophanes juxtaposes Strepsiades' ridiculous behavior throughout the play with the literary and cultural prestige accorded the legendary Golden Age. Ultimately, Strepsiades' account of his pre-dramatic life mocks both temporal tradition and comedic archetype. This paper proposes to trace extra-narrative allusions in Strepsiades' life prior to *Clouds*. In lines 43-5, contrast creates laughable distance between Strepsiades the buffoon and his former prosperity. Aristophanes draws on a common cultural understanding of the Golden Age to heighten the humor of this juxtaposition. To argue this claim, I'll consider several specific points: first, that structure and contradiction in lines 43-5 serve to mock several elements of Greek culture, including the Golden Age; second, that fragments of Aristophanes' contemporary Eupolis attest to the cultural prevalence of the Golden Age ideal; and finally, that the passage's content finds thematic precedents in Hesiod, Pindar, and what we know of the Kronia festival. For an Athenian audience, these recognizable cultural allusions bring Strepsiades' absurdity into hilarious relief.

State-Driven Development Initiatives under Kenya's Vision 2030 and Perceptions by Project-Affected Persons in the Northern Rangelands

Paola Rivera, CURO Honors Scholar, CURO Summer Fellow
Dr. Laura German, Anthropology, Franklin College of Arts & Sciences

This paper seeks to explore ongoing state-driven development initiatives (SDIs) in the northern rangelands of Kenya under the Government of Kenya's (GoK) *Vision 2030* development plan. Since the *Vision 2030* projects discussed in this paper are still in their early stages, the analysis is meant to explore early outcomes in light of project goals and GoK legal commitments to project-affected persons (PAPs) so as to highlight issues not consistent with the project goals before they are too late to amend or mitigate. The research is situated theoretically in the wider literature and critiques of state-driven "betterment schemes" which highlights the divergence between project aims on the one hand, and outcomes (both intended and unintended) on the other. Reasons behind the failure of projects to live up to expectations, and the generation of unintended effects, may be productively explored through a look at the processes through which these initiatives are carried out. This paper aims to do this through an ethnographic analysis of Koija Group Ranch in Laikipia County during early stages of implementation of *Vision 2030*. Projects include a megadam, an irrigation scheme, a road, and a power line, which are all on schedule and receiving more funding. The GoK has already started work on the power line and transport road and has hired workers and set up a camp for the megadam. Drawing on published information and interviews with PAPs, we document early project activities and evaluate them based on the extent to which they reflect duties of the GoK towards PAPs (as enshrined in relevant policy and legislation). In interviews

conducted with PAPs in the Koija Group Ranch, some attendees expressed dissatisfaction with the consultation and awareness process of some projects.

Regulation of Mitochondrial Dynamics in *C. elegans*

Spencer Robinson, CURO Research Assistant
Dr. Edward Kipreos, Cellular Biology, Franklin College of Arts & Sciences

Mitochondria play a vital role in maintaining the health of most eukaryotic cells by generating ATP, the predominant source of chemical energy for cellular processes. Production of ATP varies in response to the energy needs of a cell, and mitochondrial morphology changes to meet this need; as a deficit of ATP develops, the incidence of mitochondrial fusion increases. Fused mitochondria have been shown to produce ATP more efficiently than their tubular (non-fused) or fragmented counterparts. As such, regulation of mitochondrial morphology is critical to cellular function. Mitochondrial dynamics is regulated by several GTPase proteins. Using the nematode *Caenorhabditis elegans* as a model organism, we can study the regulatory pathways that would signal the mitochondria to adapt to the cellular bioenergetic state. EAT-3 is a conserved GTPase that induces mitochondrial fusion in *C. elegans*. SPG-7 and PPGN-1 are mitochondrial proteases, which can inhibit fusion. We hypothesize that SPG-7 and PPGN-1 inhibit fusion by proteolytically cleaving EAT-3. We aim to fluorescently tag SPG-7, PPGN-1 and EAT-3 to enable us to study their role in regulating mitochondrial fusion in *C. elegans*. These constructs are then integrated into the *C. elegans* genome by microinjection into the gonad, inducing expression of the tagged proteins in subsequent generations. It is expected that expression of SPG-7 and PPGN-1 will result in vastly reduced rates of mitochondrial fusion due to proteolytic cleavage of EAT-3, which can then be visualized under a fluorescence microscope.

Resolving Offensive and Defensive Realism

William Robinson
Dr. Andrew Owsiak, International Affairs, School of Public & International Affairs

Both offensive realism, as defined by John Mearsheimer, and defensive realism, as defined by Kenneth Waltz, are predicated on the anarchic nature of international affairs. The two theories differ, however, on how states pursue security. In offensive realism, each state is a power maximizer and seeks to become a regional hegemon; a state's security is assured by increasing its share of power at the expense of others. In defensive realism, security is dependent on reaching a balance of power; a state's security is assured by bandwagoning with or balancing against a threatening power. Despite sharing several core assumptions, the two theories remain unreconciled. I argue that by modifying the theories to account for state capacity, the two theories can be merged. Only states with a substantial share of power or potential power would abide by offensive realist thinking because only those states could become a regional hegemon. Minor powers, contrastingly, would be forced to bandwagon with or balance against the more capable, power maximizing state, and would therefore abide by defensive realist thinking. The utility of both theories is their explanatory and predictive powers. As separate theories, each provides useful insight into one segment of states, either minor or great powers. By fusing the two, the joined theory would provide more accurate explanatory and predictive powers in a way that can be applied to all states.

Abstracts

Fetal Outcome of Pregnant C57BL/6 Mice Infected Late Pregnancy with 10^3 *Plasmodium chabaudi chabaudi* AS

Kerryn Roome
Dr. Julie Moore, Infectious Diseases, College of Veterinary Medicine

Despite immunity in malaria-endemic regions, pregnant women have an increased susceptibility to a significant infection. In these women, red blood cells infected with malarial parasites can accumulate in the maternal side of the placenta, leading to drastic changes in the placental tissue which hampers fetal intrauterine growth. This leads to low birth weight, stillbirth, and preterm abortion. Due to ethical and anatomical limitations in studying placental malaria in humans, murine models are a common alternative. In this experiment, pregnant C57BL/6 mice, aged 8-12 weeks, were intravenously infected with 10^3 *Plasmodium chabaudi chabaudi* AS on day 6, 8 or 10 of gestation. The courses of infection and pregnancy status were monitored until day 18 of gestation when the mice were sacrificed to have organs and plasmas collected for assessment. Mice that were infected during mid to late pregnancy showed significantly higher parasitemia levels compared to non-pregnant infected females. Mice infected on day 6 and 8 aborted their pregnancies on days 15.5 and 16.5, respectively. The majority of mice infected on gestation day 10 did not abort by day 18, so these mice had their placentae and fetuses weighed to compare against those of uninfected pregnant mice. Although viable, these pups weighed significantly less than the pups from healthy mothers. Activated macrophages and tissue factor expression in the placentae will be analyzed via immunohistochemistry staining. Giemsa staining will then compare the placental and peripheral parasitemia. Finally, Western blot analysis will be used to assess the extent of fibrin deposition in the placentae.

Reflections on the City: Urban Space and Ideology

Lazarus Roth, CURO Research Assistant, CURO Graduation Distinction
Dr. Athanasios Samaras, Philosophy, Franklin College of Arts & Sciences

Ideology is the guiding force in shaping the physical arrangement of urban space, and through that arrangement, ideology is reproduced and reinforced into and through the members of the given society. Drawing on the works of Henri Lefebvre, David Harvey, Antonio Gramsci, and others, this paper will attempt to draw a connection between ideological reproduction and the material production of urban space. Urban space will be presented as a product of the hegemonic nature of ruling class ideology and is arranged in such a manner as to reinforce the power structures and dynamics of the society in which it manifests. To justify a ruling class conception of the normative use-values of urban space, a science like urbanism is necessarily constructed that justifies and directs the ideological formation of urban space and rationalizes the proscriptions and prohibitions for the use of that space. Finally, urban space will be presented as a site of manifestation for the unconscious desires that have been shaped by ideology in material social space.

Investigating the Effects of Removing Genes for DHPS Degradation in *Ruegeria pomeroyi* DSS-3

Selena Roth
Dr. Mary Ann Moran, Marine Sciences, Franklin College of Arts & Sciences

Nutrient cycling between marine bacteria and phytoplankton plays a significant role in carbon and sulfur cycles occurring in the ocean. Studying the interactions between a single population of a marine bacterium of the Roseobacter clade and a diatom, *Thalassiosira pseudonana* CCMP 1335, allows for closer

investigation into compounds that are important in the ecological association and the environment. In the bacterium *Ruegeria pomeroyi* DSS-3, genes key to a metabolic pathway involving the degradation of 2,3-dihydroxypropane-1-sulfonate (DHPS) are up-regulated during co-culture with diatoms. One of the final enzymes in this pathway, *cuyA* allows formation of pyruvate and bisulfite from cysteate. Pyruvate is used in cellular processes while bisulfite is expelled, contributing to the oceanic supply of dissolved sulfur compounds. A genetic knockout was performed specifically targeting *cuyA* in *R. pomeroyi*, investigating the gene's role in the overall function of the bacterium. To study the effects of an inactive *cuyA* gene, both wild type DSS-3 and the mutant Δ*cuyA* strain were grown in media with DHPS as the sole carbon source or sole sulfur source at varying concentrations. In addition, wild type DSS-3 and the Δ*cuyA* strain were each grown in co-culture with diatoms, using flow cytometry analysis to observe the population growth of each organism. In both manipulated media and especially co-culture with diatoms, the mutant strain showed stunted growth. Contributing to our understanding of sulfonate cycles in the ocean, this indicates the bacterium cannot function properly at normal levels without being able to produce pyruvate and bisulfite through DHPS degradation.

Can People with Low Self-Esteem Directly Self-Enhance?

Sahar Sabet, CURO Research Assistant
Dr. Michelle vanDellen, Psychology, Franklin College of Arts & Sciences

Self-enhancement is the desire to possess and enhance positive aspects of the self-concept. Regardless of their approach, people tend to accentuate the positive in themselves while ignoring the negative. Research consistently finds people with high self-esteem are able to self-enhance more easily than people with low self-esteem; these differences are largest on direct measures of self-enhancement. One possible reason for this disparity is that, when asked to think positively about themselves, people with low self-esteem experience more self-doubt. The purpose of this study was to investigate whether people with low self-esteem could self-enhance directly. When there are no indirect options available, participants are only able to self-enhance directly. We predicted that by alleviating some of the pressure people with low self-esteem experience when asked to directly self-enhance, the opportunity to self-doubt would be minimized. Participants reported their trait self-esteem and self-enhancement. Then participants either circled positive attributes they thought were more descriptive of themselves than their peers or they crossed out positive attributes they thought they possessed to a lesser degree than their peers. After the manipulation, participants reported their state mood, self-esteem, and implicit self-esteem. Our findings indicate that condition (circling versus crossing out) interacted with trait self-esteem to predict state self-esteem. Crossing out attributes tended to improve state self-esteem for low self-esteem participants whereas it lowered state self-esteem for high self-esteem participant. These findings suggest that this opportunity for self-enhancement functioned differently for people with low and high self-esteem.

Evaluation of Novel Antiviral Drug NSC95397 for Treatment of Swine Influenza Infections in Pig Cells

Preston Samowitz
Dr. Ralph Tripp, Infectious Diseases, College of Veterinary Medicine

Discovering countermeasures for the influenza virus has faced many obstacles because the virus incessantly evolves, causing vaccines and antiviral drugs to be ineffective. Targeting host factors instead of the virus is

thought to be an approach to limit resistant, since host targets are stable. A novel drug NSC95397 targets host cell mechanisms to treat influenza virus infections. RNA Interference (RNAi) was utilized to screen for host genes involved in the influenza virus replication and found the host gene cell division cycle 25 B (CDC25B). CDC25B is a phosphatase that dephosphorylates cyclin-dependent kinases (CDKs). An influenza non-structural protein (NS1) has been identified to be phosphorylated by a CDK, CDK1. The phosphorylation of NS1 modulates its nuclear localization and chromatin association. The viral NS1 protein inhibits host antiviral genes such as the interferon (IFN) response. Activation of the IFN response stimulates IFN-stimulated genes (ISGs) to mount an antiviral response. NSC95397 inhibits the CDC25B activity; as a consequence, the phosphorylation of NS1 does not occur causing a modulation of its interferon inhibition activity and nuclear localization. The purpose of my studies is to determine if NSC95397 can be used as an effective treatment for veterinary use in pigs to treat swine influenza infections. My project will evaluate if there is a specific escape mutation that occurs when passaging a clinical isolate of swine influenza A virus in pig kidney epithelial (PK1-LLC) cells treated with increasing drug concentrations. I hypothesize that specific mutation(s) in the influenza virus genome confer resistance to NSC95397.

Functional Consequences of Different CAAX Motifs

Colby Samuelson-Ruiz, CURO Honors Scholar
Dr. Walter Schmidt, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Many eukaryotic proteins possess a C-terminal tetrapeptide CAAX motif. This motif is known to drive a trio of post-translational modifications: isoprenylation, endoproteolysis, and carboxylmethylation. These modifications influence CAAX protein interactions with other proteins, membrane association, and can be essential for protein function. A thorough understanding of how CAAX proteins are modified post-translation is important because many CAAX proteins are of significant biomedical relevance. The Ras GTPase is a prime example: mutated Ras is associated with 90% of pancreatic cancers, 50% of lung cancers, and 30% of all cancers in humans. Given the similarities among CAAX motifs, it has been assumed that all CAAX proteins undergo the same post-translational modifications at the C-terminus. This study used the yeast mating pheromone **a**-factor and heat-shock protein chaperone Ydj1p as reporters in the model organism *Saccharomyces cerevisiae* to investigate whether CAAX proteins are processed in a similar manner. Over the course of this study, four distinct CAAX motifs were independently assessed in the context of our two reporters, and the impact on protein function was assessed. We demonstrate that the motifs markedly differ in their ability to support function of the reporters. Moreover, our findings support an unanticipated divergence in the post-translational processing of CAAX proteins that allows some proteins to be isoprenylated but not undergo the proteolysis and carboxylmethylation events that are widely thought to be coupled downstream events. We will discuss the impact of our findings, especially the potential that this noncanonical pathway may be more widespread than anticipated.

Stemflow as a Contributing Source to Early Runoff

Sam Santoso, CURO Graduation Distinction
Dr. John Dowd, Geology, Franklin College of Arts & Sciences

Panola Mountain Research Watershed (PMRW), located near Atlanta, GA, has been studied extensively for over 30 years. Earlier work by Richard Cary used geochemistry to separate storm hydrographs into four component hydrographs. During most storms, water from current rainfall was not a significant component of flow until relatively late in the storm despite bare rock in the upper reaches of the watershed. Water to the stream early in the storm, but with the geochemical signature of soil water is stemflow from trees. To investigate the potential for stemflow to contribute to early storm flow, four Yellow Poplar trees (*Liriodendron tulipifera*) were wrapped and caulked with a collar funneling the water through a tipping bucket measuring device. The tipping buckets were connected to an Arduino to save the time of each tip. A GPS was used to synchronize the high resolution real-time clocks. The timing of stemflow compared to rainfall and stream flow will be used to evaluate stemflow contributions to runoff.

MindPlay Virtual Reading Coach

Lisa Savchenko, CURO Research Assistant
Dr. Jennifer Lindstrom, Communication Sciences & Special Education, College of Education

What are the effects of an online reading intervention on at risk students' reading performance in grades one and two? We are hoping to determine whether there are significant mean differences in decoding, encoding and fluency achievement scores of at-risk students (those that are receiving Tier 2, Tier 3, or Special Education Services.) The MindPlay Virtual Reading Coach online reading intervention will be used in addition to standard English/Language Arts instruction. Participants come from a public primary school in the Southeastern United States. There will be 90 participants. Approximately half of the participants will interact with the MindPlay intervention and the other half will conduct business as usual. Intervention is on-going and results will be calculated in Spring 2015.

Understanding the Role of *Helicobacter pylori acxABC* in an *Escherichia coli* Model System

Scott Schaffer
Dr. Timothy Hoover, Microbiology, Franklin College of Arts & Sciences

Helicobacter pylori is a gram-negative bacterium that is responsible for being one of the leading causes of peptic ulcers and chronic gastritis in humans. Since *H. pylori* colonizes the stomach mucosa, it has a variety of essential genes that facilitate its ability to survive the harsh, nutrient-limited environment of the stomach. One set of genes, HP0695 (*acxA*), HP0696 (*acxB*), and HP0697 (*acxC*) allow *H. pylori* to utilize acetone as a potential carbon source. These set of genes encode for an enzyme that is homologous to acetone carboxylase from *Xanthobacter autotrophicus* and *Rhodobacter capsulatus*. Acetone carboxylase catalyzes the reaction of acetone to acetoacetate, which can then be fed into central metabolism through subsequent enzymatic events. The genes encoding for the three subunits of this acetone carboxylase, *acxA*, *acxB*, and *acxC*, have been shown to be important for the efficient colonization of *H. pylori* in the murine gastric mucosa. In our study, synthetic *acxABC* genes were generated, cloned into the expression vector pLAC22, and transformed into *Escherichia coli*. *E. coli* was chosen as a model organism as it utilizes acetoacetate, but not acetone, as a carbon and energy source. The goal of my research project was to determine if an *E. coli* strain expressing *H. pylori* acetone carboxylase is able to use acetone as a sole carbon source. Such a result would be significant, as it would allow us to use the *E. coli* strain to screen possible inhibitors of acetone carboxylase that may

have therapeutic value in controlling *H. pylori* infections.

Microwave-Assisted and Benzotriazole-Mediated Synthesis of 1,2,4-Triazole-Based Peptidomimetics

Lewis Schendowich, CURO Research Assistant
Dr. Richard Morrison, Chemistry, Franklin College of Arts & Sciences

1,2,4-Triazoles derivatives are dynamic compounds that serve a wide range of biochemical applications, including antifungal drugs, antibacterial activities, CRF1 receptors antagonists, H2 antagonists and contain inhibitory properties on Janus associated kinases. Furthermore, 1,2,4-triazoles can been utilized as a structural peptidomemtic that is highly resistant to hydrolytic cleavage at a wide variety of peptide amide bond angles, including cis and trans. Developing new and efficient techniques to synthesize 1,2,4-triazole moieties are critical for medicinal and pharmaceutical chemists. Microwave organic synthesis provides a fast and high-yielding method of synthesizing a diverse range of chemical compounds. Currently we are employing benzoletriazole chemistry along with traditional and microwave techniques to synthesize a library of single and diamino acid substituted 1H-1,2,4-triazoles. The library will contain amino acids at a variety of positions attached to a triazole core and mimic known peptide bond angles. The microwave not only enables the reaction to occur, but also expedites several reaction times to less than 40 minutes. By combining low-cost starting materials like benzoletriazoles and amino acids with the efficient technology of microwave chemistry, we have produced in good yields a technique for further triazole synthetic chemistry.

Incidence of Anesthesia-Related Fatality in Birds

Amanda Seamon, CURO Graduation Distinction
Dr. Erik Hofmeister, Small Animal Medicine & Surgery, College of Veterinary Medicine

While there is ample research about the anesthesia-related fatality rate for cats, dogs, and humans, there is little research into the rate in birds. The purpose of this study was to determine the fatality rate in birds associated with general anesthesia. Our hypothesis was that birds will have a higher fatality rate due to anesthetics than the rates in dogs, cats, and humans. Data were collected from cases seen between 2004 and 2014. Cases were identified by searching the records for patients designated as "avian" and having any inhalant anesthesia charge on their bill. Patients were organized into four groups: intensive-care unit related death, anesthesia related death, euthanized, and survived to discharge. Data collected includes date of visit, age, species, gender, pet vs. wildlife, weight, body condition score, diagnosis, procedure, American Society of Anesthesiologists status, premedication, induction medicine/anesthesia, maintenance medicine/anesthesia, fluid type, fluid route, crystalloid volume, colloid volume, heart rate nadir/peak, end-tidal CO2 nadir/peak, Inhalant anesthetic nadir/peak, temperature nadir/peak, intraoperative events, estimated blood loss, anesthesia duration, surgery duration, recovery time, recovery notes, survive to discharge, time of death, total bill, and anesthesia bill. Comparisons were made between the birds who did not survive to discharge and birds that did survive to discharge. The outcome for birds was survival to discharge 86%, died during anesthesia 3.4%, died in the intensive care unit 4.3%, or euthanized 6.3%. Overall, none of the variables studied are associated with the likelihood of death due to anesthesia in birds.

Abstracts

Behavioral Testing on Piglets to Assess Cognitive Deficits of a Traumatic Brain Injury

Kathryn Sellman
Dr. Franklin West, Animal & Dairy Science, College of Agricultural & Environmental Sciences

Traumatic brain injury (TBI) affects over 150,000 children per year and is a leading cause of neurological disability and death during childhood. There are limited treatments available, but recently induced pluripotent stem cell-derived neural stem cells (iNSCs) have shown potential as a regenerative option. Due to similarities to children in brain formation and development, we have chosen to use a piglet model to 1) develop applicable and quantifiable behavioral tests to assess cognitive function, 2) quantify cognitive deficits after sustaining a TBI and 3) determine the effectiveness of iNSC treatment in reducing cognitive deficits after TBI. To assess cognitive function we will use a spatial plus T-maze test and an object recognition test. The spatial plus T-maze test will access learning and spatial memory. Piglets will start from a north or south arm and can enter both the east and west arms, with only one arm being baited. We expect the piglets to find the reward by using extra-maze visual cues, not motor memory. The object recognition test will test spontaneous trial-unique memory. Piglets will be exposed to two similar objects within an arena for 10 minutes. After a 10-minute delay, piglets will be reintroduced to one familiar and one novel object. Time spent with each object will be measured. We expect the piglets to prefer the novel over the familiar object, based on the piglets' memory of the familiar object. The successful development of these behavioral tests will enhance our ability to assess cognitive function in piglets.

Is Everyone on Twitter Better Than You?: Correlations between Twitter and Exercise Motivation among College Students

Patrick Semanie, CURO Research Assistant
Dr. Juan Meng, Grady College Of Journalism & Mass Communication

Purpose: The purpose of this research is to better understand the effect that Twitter can have on individuals' perceptions on their own personal fitness and exercise habits. Particularly, the researcher is interested in investigating the perceptions of college-aged individuals, as they are generally attracted to a wide variety of social networks. *Research Methods:* A 30-question online survey was distributed to the students at the University of Georgia by using a convenience sampling strategy. In addition, two focus groups (one comprised of males and the other of females) were conducted in order to gather in-depth insights about the participants' perception of Twitter's effects on exercise motivation both on themselves and others. *Results:* Results of the research will show differences amongst various demographics and their perception of Twitter. The results also show that participants believe that Twitter has a greater effect on the fitness and exercise habits of others, as opposed to on their own habits. Prior research showed that Facebook could lead to negative social comparison (Chou, 2012). Findings in this research reveal similar patterns about Twitter as it pertains to exercise. *Practical Implications:* This research will help us understand how Twitter can be used to stimulate the motivations to exercise. More importantly, it will also help better explain how Twitter must be used responsibly in order to promote a positive body image amongst its users.

Mapping the Genetic Basis of Leaf Physical and Chemical Defenses in Sunflower

Rahul Shah, CURO Research Assistant
Dr. Lisa Donovan, Plant Biology, Franklin College of Arts & Sciences

Plants are faced with a variety of threats to their survival and reproduction. Such threats include disease from bacterial or fungal pathogens as well as herbivory from pests like insects. Plants have evolved a wide array of physical and chemical defenses to reduce the impact of these factors, and such traits are incredibly diverse among species. This work seeks to understand the genetic basis of variation in leaf defenses in the crop sunflower (*Helianthus annuus*). Using a 288-line association mapping panel that captures ~90% of the genetic diversity across all crop sunflower varieties, we phenotyped key defense traits including thickness, toughness, trichome density, tannin activity, and leaf ash content. Here we map variation in these traits to the sunflower genome using published genotype data for this association mapping panel, including ~5500 single nucleotide polymorphism (SNPs). Based on insights from previous studies of leaf defense evolution across wild *Helianthus*, it is hypothesized that (1) leaf defenses are likely controlled by few regions of large effect, and (2) leaf defenses likely do not share common genetic bases, with the possible exception of leaf thickness and leaf ash content. Identifying the genetic bases of leaf defenses informs breeding efforts and will improve our understanding of pest and disease dynamics in crop sunflower.

Promoting Success for English Learners: Dual-Language Immersion in Georgia

Rahul Shah, CURO Research Assistant
Dr. Linda Harklau, Language & Literacy Education, College of Education

In the last two decades, Georgia experienced unprecedented growth in immigration rates. The resultant enrollment rate of English learners (ELs) in Georgia public schools has increased by 400 percent, with nearly 90,000 new ELs enrolling annually. ELs are severely academically disadvantaged because Georgia schools do not adequately support their English acquisition needs. For example, high school ELs have lower End-of-Course-Test passing rates in all 10 tested subjects compared to their non-ELs peers. Additionally, only 44 percent of Georgia's ELs graduate high school in four years—a rate 26 percent below the state average. Georgia currently utilizes a "pull-out" model, in which ELs students are removed from traditional academic courses for a class period to be instructed in English. This places undue burden on ELs who face the pressure of learning English while simultaneously fulfilling complex high school graduation requirements. Because they lack English proficiency, ELs often cannot enroll in courses they need to graduate. This retention is discouraging, and furthers the tendency of English learners to become high school dropouts. To improve English proficiency rates and educational outcomes of ELs, Georgia should subsidize the implementation of dual-language immersion magnet programs in public schools, in which students take coursework taught in Spanish for part of the day and coursework taught in English for the other.

Formation of Mitochondria-Targeted Blood Brain Barrier Penetrating Biodegradable Nanoparticles for Stroke Treatment

Nivita Sharma, CURO Honors Scholar
Dr. Shanta Dhar, Chemistry, Franklin College of Arts & Sciences

Stroke is the third leading cause of death in the United States. There are several developing drug treatments for stroke injuries.

However, only one drug, tissue plasminogen activator, has received FDA approval. The critical need for effective treatments for stroke injuries motivated regenerative stem cell therapy aimed at re-stimulating brain activity and protecting brain cells from further injuries. A devastating effect after a stroke event is the loss of blood supply, and thus, death of brain cells. The dying cells trigger secondary immune and inflammatory responses producing a cytotoxic environment and inflammation in the brain. Several current studies are using adult stem cells (ASCs) to renew cell stimuli and inhibit immune and inflammatory responses that cause cytotoxic environments for the cells. Unfortunately, these recent studies show that ASCs cannot survive sufficiently long in cytotoxic environments to effectively integrate and replace lost cells. To protect stroke patients from significant detrimental effects, it is imperative to consider a new source of stem cells for stroke treatment. In this project, we focus on developing a cell therapy using induced pluripotent stem cell derived neural stem cells (iNSCs) that have the same capabilities as ASCs in addition to effectively integrating into damaged neural tissues. However, the functional success of iNSCs varies because of the cytotoxic brain environment. Accordingly, we are developing an efficacious biodegradable nanoparticle to deliver aspirin that can cross the blood brain barrier to reduce inflammation in the brain so that iNSCs are able to differentiate and integrate more successfully.

Body Mass Index and Performance-Based Functional Independence in Older Adults

Shubam Sharma
Dr. L. Stephen Miller, Psychology, Franklin College of Arts & Sciences

Body mass index (BMI) aids in the classification of individuals as underweight, normal, overweight, and obese, functioning as a tool to determine an individual's risk of developing different problems, including physical health diseases, cognitive dysfunctions, and behavioral issues. One variable BMI has shown a relationship with is functional independence in older adults. Functional independence is characterized by the ability to perform both basic activities of daily living (BADLs) and also more complex, instrumental activities of daily living (IADLs). Previous research has utilized self-report measures to assess functional independence in older adults, yielding inconsistent results. The purpose of the present study was to assess functional ability in 75 older adults using a performance based measure, the Direct Assessment of Functional Status-Revised (DAFS-R). This study hypothesized that BMI level would correlate with an individual's functional ability, specifically IADLs. BMI was calculated according to the World Health Organization's formula: BMI = Weight (in lbs) / Height (in inches) ^ 2. Curvilinear regression analysis was used to analyze the relationship between BMI and functional ability. Results approach significance ($p = 0.084$) suggesting a curvilinear relationship may exist between BMI and functional ability. If borne out, this relationship would suggest that the more extreme an individual's BMI – either higher or lower – the greater the risk for functional disability.

Mitigating the Spatial Mismatch of Social Service Provision and Demand: The Potential of Faith-Based Facilities

Keller Sheppard, CURO Research Assistant
Dr. Sarah Shannon, Sociology, Franklin College of Arts & Sciences

Comparing the concentration of social service programs to the location of neighborhoods with a high potential demand for those services allows for an assessment of the efficiency of the social safety net's geographic coverage. Agencies are not operationally restricted to their own facilities. Indeed, there are a number of means by which agencies can

mitigate the effects of geographic inaccessibility. One such strategy is the utilization of other organizations' facilities. Faith-based facilities such as churches can provide office or meeting space and allow for a more efficient distribution of social services. The current set of social service providers located in Athens-Clarke County and their potential faith-based collaborators will be mapped over the potential demand across the city measured by data from 2009-2013 American Community Survey 5-year estimates. Locations of social services providers are generally clustered in and around the center of the city with geographically underserved areas of high potential demand along the periphery. The potential for faith-based institutions to penetrate these areas both spatially and culturally is examined using a method of qualitative GIS. Faith-based facilities' cultural accessibility and current collaborative behaviors with social service provides are investigated through semi-structured interviews with prominent church parishioners throughout the county. The utilization of faith-based facilities presents an opportunity to more effectively reach underserved and isolated neighborhoods by decreasing the travel costs associated with service uptake.

Role of Glypican-1 in Prostate Cancer Cell Growth

Sheela Sheth, CURO Research Assistant
Dr. Brian Cummings, Pharmaceutical & Biomedical Sciences, College Of Pharmacy

Glypican-1 (GPC-1) is a membrane-bound heparan sulfate proteoglycan involved in intracellular and extracellular signaling, and is suggested to mediate cancer cell proliferation and metastasis. GPC-1 shuffles Group IIA secreted phospholipase A_2 ($sPLA_2$ IIA) between intercellular and extracellular domains. High concentrations of $sPLA_2$ IIA are destructive to the cellular membrane of diseased tissues, such as in arthritis and atherosclerosis; however, prostate cancer cells remain viable under high concentrations of $sPLA_2$ IIA (22-fold increased expression). We hypothesize that GPC-1 mediates prostate cancer cell growth and viability through its interaction with $sPLA_2$ IIA. To initially address this hypothesis we determined the expression of both GPC-1 and Group IIA $sPLA_2$ in non-cancerous (RWPE-1) and cancerous (LNCaP, DU-145 and PC-3) prostate cell lines. Immunoblot analysis demonstrated that prostate cancer cells have increased expression levels of Group IIA $sPLA_2$ compared to RWPE-1. Interestingly, GPC-1 expression was detected in the metastatic prostate cancer cells (DU-145 and PC-3), but was not detected in the non-cancerous (RWPE-1) and moderately metastatic prostate cancer cells (LNCaP). This suggests that GPC-1 may play a role in cancer metastasis and protecting cells from $sPLA_2$ IIA's toxic effect in advanced prostate cancers. We are further testing our hypothesis using lentiviral transfection of shRNA to knock down GPC-1 in PC-3 cells and confirming knock down using immunoblot analysis. These cells will be used in future studies to test their sensitivity to Group IIA $sPLA_2$, as well as their differences in proliferation and migration activities, as compared to control cells.

An Investigation of Anaerobic Methane Oxidation by Consortia of Methanotrophic Archaea and Bacterial Partners Using Process-Based Modeling

Yimeng Shi, CURO Summer Fellow, CURO Research Assistant
Dr. Christof Meile, Marine Sciences, Franklin College of Arts & Sciences

Biological activities, including oxidation of methane in marine sediments, play an important role in the global methane cycle. Methane can be converted to CO2 under anaerobic conditions by microbial consortia

consisting of archaea and bacteria. We used reactive transport models to study the magnitude of methane oxidation. Compared to rates in laboratory incubations, it was shown that reaction kinetics, transport intensities, and energetic considerations all decisively impact the overall rate of methane consumption. We applied the model to different environmental settings and spatial distribution patterns of archaea and bacteria. E.g., in some cases archaea and bacteria separately form their own groups while in some other cases they are well mixed with each other. We also investigated newly proposed potential reaction pathways and studied the effectiveness of various potential chemical species, including acetate, hydrogen, formate, and disulphide between the archaea and bacteria. Moreover, we investigated the effect of hyper diffusion and nanowires, when the potential chemical species diffuses at a higher speed by potential biological vehicles. We concluded that for the six spatial distribution patterns, the well-mixed situation has significant influence on the efficiency of the oxidation of methane, because the vicinity of bacteria and archaea counteracts the build up of products and therefore prevents the thermodynamic shutdown of microbial metabolism. Also, disulphide has the potential to serve as efficient intermediate species. Our simulations with hyperdiffusion or nanowires show that effective electron transport between the point of reduction and oxidation is a critical aspect for efficient anaerobic methane oxidation in microbial consortia.

Asymmetric Functional Movement Screen Scores and Injury Occurrence in Collegiate Female Athletes

Taj Shorter
Dr. Cathleen Brown Crowell, Kinesiology, College of Education

There is limited research discussing the differences in bilateral Functional Movement Screen (FMS) scores and injury occurrences in female collegiate athletes. Increased risk of injury has been observed in athletes with poor FMS scores, but it is unknown if injury occurrence is associated with asymmetric functional movement. The purpose of this study was to determine if injury occurrence is associated with asymmetric FMS scores in the lower extremities of Division I female collegiate athletes. Asymmetry was defined as ≥1 point difference in unilateral tests. The FMS scores of 29 consented female athletes (18 soccer and 11 basketball) were obtained by trained raters prior to the start of the fall semester. Injuries were documented during the season by the teams' sports medicine staff. The injured group contained those who missed ≥1 day of full sport participation due to athletic-related injury. The uninjured group did not miss any time. Nine chi-square tests were performed using variable crosstabulations of the side of lower extremity asymmetry (lower scoring limb) and the side of injury (side variable). No significant results were found for the chi-square tests (Cramer's $V=0.022$, $p=0.904$). Injury occurrence does not appear to be associated with side of lower asymmetry FMS scores in the lower extremities in this preliminary study of female collegiate athletes. Future research should focus on whether an asymmetry in functional movement pattern leads to injury over time.

The Complete Genome of *Diachasmimorpha longicaudata* rhabdovirus: A Symbiont of Parasitoid Wasps

Tyler Simmonds
Dr. Gaelen Burke, Entomology, College of Agricultural & Environmental Sciences

Several lineages of parasitoid wasps employ viral symbionts as a mechanism to deliver immune-suppressing genes to the host to prevent the wasp's eggs from being destroyed during development by the host immune system. These viral symbionts have been acquired at several different points during the

evolution of parasitoid wasps, and show differing degrees of genome re-organization in response to the symbiotic relationship. The Polydnaviruses (PDVs), found in Braconid and Ichneumonid wasps, are the oldest and best characterized parasitoid wasp symbionts and have undergone extensive genome re-organization. In comparison, little is known about the more recent viral symbionts found in other parasitoid wasp lineages. By examining both ancient and recent viral symbionts, we can further understand the process that has allowed these viruses to transition to a beneficial role. We examined one of the more recent viral symbionts acquired by parasitoid wasps, *Diachasmimorpha longicaudata* rhabdovirus (DlRV), via sequencing and phylogenetic analysis. The assembled DlRV genome is 13kb in size and contains a total of 6 open reading frames (ORFs). Three ORFs correspond to the genes for N, G, and L proteins found in other rhabdoviruses. Additionally, a parasitism-specific protein (PSP24) was identified that previously had unknown origin in the fly and wasp system, and may play a key role in mediating successful parasitism. Phylogenetic analysis of the DlRV L amino acid sequence revealed that DlRV is closely related to two recently discovered insect rhabdoviruses, *Spodoptera frugiperda* rhabdovirus (SfRV) and Taastrup virus.

The Role of the Chaperone-Protein Interactions in Driving Protein Trafficking in the Malaria Parasite

Brandon Sims
Dr. Vasant Muralidharan, Cellular Biology, Franklin College of Arts & Sciences

Malaria is a widespread, global disease that causes 225 million cases and hundreds of thousands of deaths every year. *Plasmodium falciparum* is the most deadly cause of human malaria. The goal of my research is to investigate new classes of drug targets in *Plasmodium falciparum*. My lab studies the roles of a family of proteins called chaperones or heat shock proteins (Hsp) in allowing the parasite to establish its habitat within red blood cells. My project is to engineer Hsp expression constructs to generate protein chaperones to test their interactions. I have worked to engineer ten constructs; including five chaperones (Bip, Hsp-660, Hsp70x, Grp-94, and Hsp110) with and without a degradation domain in a pET-28 expression vector. First I amplified the target sequence on the gene of interest via PCR. Next restriction nucleases were utilized to cut both the intended insert and the recipient pET-28 vector. The insert and vector were fused together in a ligation reaction. These reactions were then transformed into *Escherichia coli*. To confirm uptake, DNA from *E. coli* colonies was purified, digested, and run on an agarose gel. Currently Bip, Hsp-660, and Hsp70x in pET-28 and Hsp-660 in pET-28 with the degradation domain have been screened showing successful uptake of the plasmid. The other five are currently being screened. Once all ten constructs have been successfully made I will test protein-chaperone interactions *in vitro* necessary for protein trafficking in *Plasmodium falciparum*.

Will Butterfly Gardens Take Off? Butterfly Dynamics and Recruitment in Response to Planted Gardens

Stuart Sims
Dr. Andy Davis, Odum School of Ecology

Global decline in pollinators poses a threat to ecological communities and processes worldwide. Habitat loss and degradation have led to several efforts to restore habitat area for both plants and their associated pollinators. As a result, butterfly gardens have become an emergent trend in pollinator conservation efforts. Little is known about the recruitment success of pollinator gardens or their most efficient composition. Here, we investigate garden composition, maintenance schedules, and population dynamics of several species in

order Lepidoptera to determine the effectiveness of pollinator gardens for conservation. We also investigated larval survival both inside and outside the garden plots at varying distances. We found that across species, adult abundance, egg counts, and species richness were explained by plant type, month, and number of plants blooming. Maintenance scheme and structural complexity did not have a significant effect. Survival increased outside the gardens, but not strongly with distance from the gardens. Understanding the importance of these variables in pollinator gardens helps optimize their effectiveness in conservation efforts.

Genotype-Phenotype Correlations in POMGNT1 and POMGNT2

Danish Singh, CURO Summer Fellow, CURO Research Assistant
Dr. Lance Wells, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Congenital muscular dystrophies (CMDs) affect the lives of millions of people every year. These genetic disorders are caused by the dysfunction of the dystrophin-dystroglycan complex that helps to coordinate cell movement and are thus appropriately termed dystroglycanopathies. Specifically the protein alpha-dystroglycan is of interest to this project since this protein in heavily glycosylated and the o-linked glycan structures on the protein are important of its function to bind laminin to a transmembrane protein. Dystroglycanopathies occur when these o-linked glycan structures are not glycosylated on to alpha-dystroglycan properly by other enzymes in a process known as post translational modification (PTM). The two enzymes investigated in this project were POMGNT1 and POMGNT2 which extend O-mannose initiated structure of α dystroglycan with a GlcNAc (N-Acetylglucosamine) by producing UDP-GlcNAc. While both these enzymes attach the same sugar they do it in different linkages and the sugar structure is glycosylated differently based on the linkage. Thus if a mutation occurs in one of these enzymes it can result in a glycan not being attached to alpha-dystroglycan which can cause the protein to not to bind to laminin which results in weakened muscle movement, a symptom of congenital muscular dystrophy. The aim of this project was to correlate specific single, nucleotide mutations in POMGNT1 and POMGNT2 to specific changes in enzymatic activity and also to understand how these two enzymes differentiate which one will glycosylate alpha-dystroglycan and when. By doing so this can provide diagnostic information on how to treat specific CMDs.

Profiling the Spatiotemporal Regulation of DNA Methylation in a Social Insect

Daniel Skowronski, CURO Research Assistant
Dr. Brendan Hunt, Entomology, College of Agricultural & Environmental Sciences

DNA methylation plays a role in development through the regulation of gene function in a diverse number of eukaryotes. The methylation is also affected by environmental input and may thus represent a fundamentally important mechanism by which development is influenced by the environment. Evolutionary conserved enzymes known as DNA methyltransferases (DNMTs) are responsible for DNA methylation. *De novo* methyltransferases of the DNMT3 family establish new methylation patterns within an organism's genome. Maintenance methyltransferases of the DNMT1 family maintain previously established methylation patterns across cell generations. In this study we have identified orthologs of DNMT1 and DNMT3 in the genome of *Solenopsis invicta* (red imported fire ant) as well as designed and validated qPCR primers for these genes. We will be profiling patterns of gene expression across seven developmental stages (egg, first through

fourth-instar, pupae, and callow adult) from two nests of the monogyne (single reproductive queen per nest) social form of *S. invicta* in order to provide insight into the timing and levels of activity of mediators of DNA methylation. Our effort represents a novel contribution to the field of insect epigenetics. This research will enable further investigations of the relative roles and temporal patterns of *de novo* and maintenance DNA methylation, which are integral to understanding environmental contributions to social insect development.

A GDOT Case Study for the Beneficial Use of HVFA in Concrete Pavements

Scott Smith, CURO Research Assistant
Dr. Stephan Durham, College of Engineering

The plurality of past academic life-cycle assessments for concrete pavements have shown the beneficial use of high volumes of supplementary fly ash in concrete pavement mixtures. However, because of the overall size and scope of these studies, findings were intangible due to their magnitude. An economic, structural, and environmental study of high volume fly ash (HVFA) in concrete mixtures is detailed in this research, but the scope has been limited to an 11 mile section of pavement located on I-75 in Bogart, GA. Through the use of life cycle assessments, it was found that the total carbon footprint for the pavement section could be reduced 17% by increasing the fly ash content of the concrete mixture from 10% to 20%. Quantitatively, this is enough energy to power roughly 4,500 average American homes for an entire year. This study will provide the quantitative data in areas of structural performance, economic savings, and environmental sustainability that will provide GDOT with the necessary information to modify the current Class I concrete specifications from the current 15% to an increased level. Additionally, a new and innovative metric for communicating the efficiency of a structural material is being developed. The concept is to generate a "nutrition" label, similar to those required by the FDA for food, but for structural materials. This labeling system would provide an understandable metric for contractors, architects, and other consumers to cross-compare service life, cost, and environmental impact.

A De-Demonized Future for the Radical Right in France? Media Framing of Marine Le Pen

Alexandra Snipes, CURO Research Assistant
Dr. Cas Mudde, International Affairs, School of Public & International Affairs

Sharing the core values of authoritarianism, anti-establishment populism, and nativism, populist radical right parties have strengthened their presence and legitimacy across Europe. France's Front National's platform includes an aggressive anti-immigration policy, an emphasis on law and order, a welfare state that privileges French "natives," and a virulent opposition to the European Union. The party traditionally appealed to predominantly male voters with low incomes, low educational levels, and low social statuses. In 2011, party leadership was passed to Marine Le Pen, daughter of party founder Jean-Marie Le Pen, and she has sought to modernize the party's image by declaring a de-demonization strategy for the Front National. This analysis focuses on her and her party, who witnessed a surge in media attention this past summer after their successes in the European Parliament elections. Women in politics are often viewed in the mainstream media as being more liberal than their male counterparts, even if their political opinions are in fact more conservative. Journalists never claimed that the achievements of the Front National under Jean-Marie Le Pen were due to a liberalization of his policy stances, making him more appealing to the mainstream. These claims are

now ever-present in the media stampede surrounding his daughter. To examine whether gendered media bias exists cross-nationally, I analyze articles in two American newspapers, *The Economist* and the *New York Times*, and two French newspapers, *Le Monde* and *Figaro*, focusing on the perception of Marine Le Pen.

Anti-Binge Drinking Public Health Campaigns: Their Effectiveness in Targeting Female College Students

Margaret Sparks, CURO Research Assistant
Dr. Juan Meng, Grady College of Journalism & Mass Communication

Purpose: The purpose of this research is to determine the effectiveness of anti-binge drinking public health campaigns aimed at female college students. In doing so, the research presented in this paper compares different mediums, print and video, used in this particular public health campaign to determine the most effective medium for targeting this particular public. *Research methods*: An online post-test-only experiment was used. Participants were randomly exposed to one of four different conditions (no stimuli, print advertisement, video advertisement, or both the print and the video advertisements), followed by the same questionnaire. Approximately 100 completed responses were collected (approximately 25 responses per experimental condition). A series of focus groups were also conducted in order to obtain insights on the investigated subject. *Findings*: Results suggest that video is the most effective medium for the anti-binge drinking campaign. Participants who watched the video elicited the most negative attitudes toward binge drinking. Results also reveal that increased levels of exposure to anti-binge drinking material will lead to negative attitudes toward binge drinking. *Practical implications*: Public health campaigns targeting female college students should be mindful that video is the most effective medium. Also, it is important to note that increased exposure to anti-binge drinking campaigns will affect audience's attitudes toward the subject. Therefore, future campaigns should integrate such strategies to increase effectiveness.

Development of an Improved Tuberculosis Vaccine

Jaclyn Speer, CURO Research Assistant
Research Professionals: Monica LaGatta, Simon Owino
Dr. Russell Karls & Dr. Frederick Quinn, Infectious Diseases, College of Veterinary Medicine

An experimental tuberculosis (TB) vaccine strain under study in our laboratory features a naturally, cold-adapted *Mycobacterium* species carrying a plasmid encoding the protein Antigen 85B (Ag85B) from the TB-causing bacterium *Mycobacterium tuberculosis* (*M.tb*). The Ag85B protein is known to be secreted to the bacterial surface in both *M.tb* and the vaccine platform strain. While the Ag85B-expressing vaccine yields a strong immune response, our hypothesis is that the vaccine can be enhanced if additional *M.tb* surface or secreted proteins are expressed simultaneously with Ag85B and exported to the surface of the vaccine strain. Genes encoding *M.tb* target proteins were obtained and inserted adjacent to the Ag85B gene, such that the target protein is synthesized as a fusion to the C-terminus of the Ag85B protein. Restriction endonuclease digestion and DNA sequencing was performed to screen for the expected DNA banding patterns and for the absence of mutations in the generated plasmids. A plasmid encoding one of the Ag85B fusion constructs was confirmed free of mutations. It was recently introduced into a fast-growing species (*Mycobacterium smegmatis*) to assess fusion protein synthesis and localization to the bacterial surface. Similar analyses will be performed upon introduction of this plasmid into the vaccine strain. Based on earlier studies with Ag85B, we anticipate that if the

Ag85B fusion protein is surface-localized in *M. smegmatis*, then it is likely to be located similarly in the vaccine strain, which will support future studies to test the efficacy of this new vaccine strain.

Bone Fracture Putty: A Combined Stem Cells and Lentiviral Approach

Karishma Sriram, Foundation Fellow, CURO Research Assistant
Dr. Steven Stice, Animal & Dairy Science, College of Agricultural & Environmental Sciences

Worldwide, there is a need for effective methods of treating non-healing fractures. Some bone fractures, termed *delayed unions*, which do not heal within 20 weeks, or *nonunions*, which do not heal within six months, are the result of more severe fractures, constituting nearly 10% of the 7.9 million fractures sustained yearly. Bone morphogenetic protein 2 (BMP2) can induce rapid ossification when used to treat bone defects. MSCs can function as a vector to deliver BMP2, while the lentivirus, containing the gene for BMP2, can allow transduced stem cells to confer the BMP2 protein. Thus, lentiviral BMP2-transduced MSCs will generate enough exogenous BMP2 to produce heterotopic ossification in mouse models, and the MSC will release trophic factors, enhancing the effects of BMP2, especially when confined inside a hydrogel matrix—such as glycosaminoglycan (GAG). For the mouse experiments, 3 million cells in phosphate buffer saline (PBS) and 350,000 cells in GAG gel were harvested and injected into the leg muscles of 8 non-obese diabetic/severely-compromised immunodeficient (NOD/SCID) mice. Furthermore, GAG gels were lyophilized and combined with GFP-labeled MSC to increase viability and even distribution of the MSC, as well as the total volume of cells injected. Observations from this experiment suggest the possibility of using a greater number of transduced MSCs in lyophilized GAG to induce more bone production. The observations from the mice indicate that the stem cells transduced with the BMP2 gene were successful in producing bone in mice and that the GAG gel successfully encapsulated the cells and enhanced the BMP2 production—and therefore, bone production.

Retinal Development with IFT122

Romik Srivastava, CURO Research Assistant
Dr. Jonathan Eggenschwiler, Genetics, Franklin College of Arts & Sciences

What are the mechanisms controlling the specification and morphogenesis of the mammalian retina? Several cell-intrinsic factors (e.g. Rx, Six3, Lhx2, Pax6, Pax2, Chx10) and cell-extrinsic signaling pathways (e.g. Hedgehog, Bone Morphogenetic protein, Wnt, retinoic acid) have been shown to participate in this process but how they are coordinated and used to execute retinal development remains unclear. To gain a better understanding, our lab is studying several mutations in mouse genes that disrupt specific aspects of retinal development. In addition to characterizing the mutant phenotypes, it will be important to understand the influence of developmental history and tissue-specific requirements of these genes in retinal formation. A useful way to address this question will depend on the characterization of the developmental potential of mutant cells in different contexts. Our goal is to exploit the *in vitro* and *in vivo* differentiation of mouse embryonic stem cells that harbor mutations in these genes. For this purpose, Mr. Srivastava will work to generate mutant embryonic stem cell lines that carry the mutations and express a GFP marker that will allow us to follow the fates of the mutant cells. Following this, we will conduct two types of experiments. First, wild-type and mutant ES cells will be subjected to *in vitro* differentiation protocols to form retinas and optic cups in the culture

dish. We will determine whether the mutant cells, in a heterologous environment, retain an inherent potential to give rise to retinal cell fates and retinal tissue morphogenesis. Second, the mutant and control ES cells will be microinjected into wild-type blastocysts to generate mosaic embryos composed of both types of cells. We will then determine whether, in a largely wild-type environment, the mutant cells are rescued in their ability to give rise to retinal cell fates.

The Effects of a Fucosyltransferase 3 (FUT3) Gene Knockout in *Arabidopsis thaliana*

Heather Steckenrider, CURO Graduation Distinction
Dr. Michael Hahn, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

The Fucosyltransferase (*FUT*) family of genes is currently being characterized in *Arabidopsis thaliana*. However, only *FUT1*, *FUT4,* and *FUT6* have been characterized successfully. It has been found that *FUT1* encodes a fucosyltransferase that fucosylates xyloglucan while *FUT4* and *FUT6* encode fucosyltransferases that appear to fucosylate arabinogalactan proteins. The fucosylation of xyloglucan by *FUT1* has been shown in the leaves of *Arabidopsis thaliana,* and the fucosylation of arabinogalactan proteins by *FUT4* has also been shown in the leaves of *A. thaliana*. The pronounced expression of all three of these *FUT* genes has been shown in the roots of *A. thaliana*. The expression pattern of the *FUT3* gene in Arabidopsis, as well as the subcellular localization of the FUT3 protein remain unknown. The Arabidopsis Information Resource predicts that FUT3 is involved in fucosylation based on its similarity to FUT1, but it predicts that the specific functionality is different. So far, two plant lines carrying homozygous mutations in the *FUT3* gene have been identified (*fut3* mutants). These *fut3* mutant plant lines will be compared through polymerase chain reaction and gel electrophoresis with the wild type *A. thaliana* plants in order to obtain information about the function(s) of FUT3. I have isolated homozygous mutants through these methods to compare with the wild type *A. thaliana*.

The Effectiveness of Counseling and Psychiatric Services at the University of Georgia: An Empirical Investigation

Mara Steine, CURO Research Assistant
Dr. Juan Meng, Grady College of Journalism & Mass Communication

Purpose: The purpose of this research is to identify the effectiveness of mental health programs on the University of Georgia campus by particularly examining the Counseling and Psychiatric Services (CAPS) provided by the University Health Center. The research aims at determining the general knowledge of the CAPS program on campus as well as the success of the CAPS program in its mission to help students.
Design/methodology/approach: The researcher used three research methods in this study to investigate the subject: (1) an online survey of UGA undergraduate and graduate students; (2) two focus groups—one with five participants and the other with four participants—with UGA students; and (3) in-depth interviews with mental health professionals at the University of Georgia.
Findings: Results suggest that students at the University of Georgia are generally not aware of the services CAPS provides to students. Mental health is also an issue on campus since many students struggle with depression and stress stemming from their academic endeavors. *Practical implications*: CAPS needs to find effective ways to reach out to students so that they are aware of the resources and help available on campus. CAPS needs to put emphasis on reaching out to freshmen, since being new to campus can pose many challenges to maintaining mental health. Speaking at new student orientation or

freshmen programs can be a great way to reach those target groups. *Originality/value*: The study provides insights into the effectiveness of CAPS programming and the issues that surround mental health on the college campus. It is important that students receive the help they need in order to be successful in college and beyond.

Understanding and Preserving the Practice of Medicinal Plant Cultivation and Use in San Luis, Costa Rica

Olivia Stockert, CURO Research Assistant
Dr. Jon Calabria, College of Environment & Design

San Luis is a small community in the Monteverde region of Costa Rica with a rich history of medicinal plant use, although few studies have documented this tradition in a way that makes information accessible for other researchers and for the local community. The use of medicinal plants is an important way for members of the community to share culture, and some residents of San Luis have observed that this generational transfer of traditional knowledge is in decline as modern pharmaceuticals become more prevalent. This study was conducted in order to determine residents' attitudes about the use of medicinal plants and the environment where they are found or cultivated. Upon the recommendation of University of Georgia Costa Rica Campus staff, selected residents of San Luis were interviewed in the summer of 2014. Open ended interviews were conducted in Spanish and the interviewer asked about environmental knowledge and ideology, medicinal plant use, and relevance of medicinal plant use to younger generations. Several themes emerged from the interviews indicating that older residents are more likely to use medicinal plants and have concerns about ineffective conservation strategies and limited adoption of medicinal plants by younger generations. Respondents indicated that educating others about traditional medicinal plant practice is an important part of the community's history and identity, which can also foster conservation. These findings reveal the critical role of medicinal plants in the San Luis community and their waning cultivation and use in recent years. Survey respondents suggested solutions to reverse this trend that included direct education of the younger generation and assistance from UGA Costa Rica to preserve this tradition. One way to address this perceived decline in interest and use of medicinal plants is to establish a community of practice. Traditional knowledge of medicinal plant cultivation and use could potentially be preserved while simultaneously strengthening cross-generational bonds within the community, educating younger generations, and encouraging conservation. Further research could implement a formalized community of practice and assess its effectiveness in preserving this important facet of San Luis's culture.

Leaf Litter Quality, Not Local Adaptation of Macroinvertebrate Communities, Drives Leaf Decomposition in Forested Headwater Streams

David Stoker, CURO Research Assistant
Dr. Catherine Pringle, Odum School of Ecology

Resource subsidies from terrestrial ecosystems can be important for stream ecosystem structure and function. Subsidy dynamics between terrestrial and aquatic ecosystems are dependent on the amount, timing, and identity of the resource, and consumer interactions within recipient systems. Forested headwater streams depend on leaf litter inputs, and intra- and inter-specific variation in leaf litter quality affects leaf decomposition and macroinvertebrate community assemblage. Here, we evaluated the relative importance to leaf litter decomposition of (1) local adaptation of macroinvertebrates; and

(2) leaf litter quality. We conducted a full reciprocal transplant experiment between two low- and two high-elevation streams within the Coweeta Hydrologic Laboratory, Otto, NC. Leaf input data were used to create leaf packs characteristic of riparian zones for each elevation, and leaf packs were deployed in home and away sites. We observed greater decomposition of higher quality leaf packs, irrespective of deployment site ($P = 0.001$). There were non-significant differences between leaf packs deployed in home or away sites ($P = 0.406$). Our results suggest litter quality, not local adaptation, drives leaf decomposition in these forested headwater streams.

Design and Analysis of Reactive Red Dye 120 Absorption by Nanocellulose Gel

Zack Stokes
Dr. Abhyuday Mandal & Dr. T. N. Sriram, Statistics, Franklin College of Arts & Sciences
Dr. Suraj Sharma, Textiles, Merchandising & Interiors, College of Family & Consumer Sciences

The reduction or elimination of water usage in dyeing fabrics is an important concern to many who participate in the activity on an industrial scale. One way of addressing this issue is to make the dyeing agent more responsive to the material it is being applied to. Research has shown that the nanocellulose gel obtained from wood pulp, when combined with certain dyes, such as Reactive Red 120, can permanently bind to the cotton textile surface as a uniform thin film. The extent to which the dye is absorbed by the nanocellulose is thought to be influenced by several factors, such as the volume and concentration of the dye used, the amount of time for which the gel solution is heated, and the temperature at which this heating is done. We have determined levels for these factors and used a fractional factorial design. Analyzing the data from this experiment, we are investigating the combination of factor levels which maximizes the absorption. Additionally, as a follow up to this process we can quantitatively determine the change in the dye color and use both pieces of information to create a measure for the overall dye performance. Our statistical analysis has the potential to reduce the amount of water needed to complete the coloring process while allowing the dye to maintain much of its original intensity. This could lead scientists to create a more environmentally-friendly process, which has broader social benefits.

The Influence of Caregiver Emotional Functioning on Perceived Barriers and Adherence in Adolescent Solid Organ Transplant Patients

Tyler Stollman, Charlotte Goldman, Kelsie Flanigan
Graduate Students: Cyd Eaton, Ana Gutierrez-Colina, Julia LaMotte
Dr. Ronald Blount, Psychology, Franklin College of Arts & Sciences

Previous studies have shown significant relationships between patient emotional functioning (EF), medication adherence, and barriers to adherence in adolescent solid organ transplant recipients. However, little is known about the role of caregivers' EF on patients' barriers and adherence. This study investigated the influence of caregiver EF (i.e., anxiety and depression symptoms) on barriers and medication adherence, beyond that explained by patient EF, in adolescent transplant recipients. Forty adolescent patients (*M* age= 16.03) and caregivers (*M* age= 44.85) completed self-report measures of their own EF and adolescents' medication adherence and barriers to adherence. Transplant types included 10 kidney, 11 liver, and 19 heart. Correlational analyses demonstrated higher levels of caregiver depression and anxiety symptoms were associated with more patient barriers and lower adherence. Multiple regression analyses showed caregiver EF accounted for significant variance (+

association), beyond that accounted by patient EF, in predicting barriers related to medication ingestion issues (depression model: $R^2 = .552$, $p < .01$; anxiety model: $R^2 = .515$, $p < .01$) and regimen adaptation issues (depression model: $R^2 = .38$, $p < .05$; anxiety model: $R^2 = .234$, $p < .05$). Caregiver EF accounted for significant additional variance (-association), beyond that accounted by adolescent EF, in predicting adherence (depression model: $R^2 = .147$, $p < .05$; anxiety model: $R^2 = .169$, $p < .05$). These results suggest that intervention to reduce caregiver anxiety and depression levels may help lower adolescents' barriers to adherence and increase medication adherence.

Properties of the Monkey Saddle

John Stroud, Foundation Fellow
Dr. David Gay, Mathematics, Franklin College of Arts & Sciences

In mathematics, a critical point of a function is a specific point where the function is level or unchanging. A monkey saddle graph is a three-dimensional surface, often studied in multivariable calculus courses, with an unusual type of critical point. The monkey saddle itself is similar to a normal saddle graph, but with three depressions instead of two. The interesting feature of this saddle is that its critical point is always an inflection point and never a local minimum or maximum regardless of the intersecting plane. We wish to study the monkey saddle to better understand its unusual fixed point and its formation of bifurcations as we perturb the surface. My research concerns creating a short movie using Sage, an open-source Python-based mathematics software, to generate three-dimensional pictures of the monkey saddle changing as its parameters change, as well as mathematically understanding how perturbations of the surface affect its fixed points. Other methods include using the Tachyon ray-tracing system that operates on top of Sage to create more realistic images.

Cryptosporidiosis: New Methods for Combating an Important Disease

Caleb Studstill, CURO Research Assistant
Dr. Boris Striepen, Cellular Biology, Franklin College of Arts & Sciences

Diarrheal diseases are responsible for nearly ten percent of early childhood mortality around the world. *Cryptosporidium*, a unicellular, eukaryotic parasite is among the most important causes of diarrhea in infants. In the United States, *Cryptosporidium* is a threat to people who are immunocompromised due to HIV/AIDS infections or organ transplants. To prevent and cure this disease, better tools for studying the parasite are essential. Recently, we have developed technology that enables us to genetically modify *Cryptosporidium parvum* parasites. I constructed the DNA transformation vectors necessary to accomplish this breakthrough. This included the cloning of plasmids for utilizing the CRISPR/Cas9 system in *C. parvum*. Now, we can detect parasitic infection with great sensitivity and precision. In addition, we can now isolate mutants of the parasite as well as determine gene function within *C. parvum*. In the research presented here, I use cloning and molecular biology techniques to make constructs containing different genetic reporters and drug markers. This will allow us to further develop methods for studying the parasite's cellular biology. I will report on the use of the CRISPR/Cas9 method for modifying *Cryptosporidium parvum* and the effectiveness of these new constructs in the parasite.

Investigating Student Satisfaction and Social Ties in a Biology Research Network

Zoheb Sulaiman, CURO Research Assistant
Dr. Jennifer Jo Thompson, Crop and Soil Sciences, College of Agricultural & Environmental Sciences

This ongoing longitudinal study investigates an interdisciplinary biology research collaboration across several institutions to examine the impact of networked research participation on undergraduates. We have adopted a mixed-methods approach—conducting observation and interviews with undergraduate researchers, and collecting survey data about their network interactions and outcomes. We are conducting a multiyear network analysis to examine the relationship between students' position in the network and their outcomes. For example, preliminary analyses of these data indicate a correlation between research satisfaction and students' total number of ties the following year. In Spring 2015, to further investigate the significance of these preliminary network results, we conducted observations and interviews with undergraduates currently in the research network (N=7). We are analyzing qualitative data to investigate how students characterize research satisfaction, and how satisfaction relates to their formation of social ties to students and faculty. To further investigate the impact of networked research in particular, we are continuing to explore the relationship between student outcomes and ties to individuals outside their home institution. This research contributes to the development of hypotheses of how participation in collaborative science influences undergraduate researchers and their persistence in scientific careers.

Capabilities of Detecting Atmospheric Cosmic Ray Induced Muon Showers by the NOvA Far Detector

Mehreen Sultana, CURO Research Assistant
Dr. Craig Wiegert, Physics & Astronomy, Franklin College of Arts & Sciences

The research goals of Fermilab's NuMi Off-Axis Electron Neutrino Appearance (NOvA) are to observe muon neutrino to electron neutrino oscillations, determine the ordering of neutrino masses, and explain violation of matter/anti-matter symmetry. However, NOvA can also be used to study cosmic ray induced high energy extensive air showers. This presentation describes the initial characterization of NOvA as a cosmic ray detector. The detector has a combination of large size and high spatial resolution that will allow future studies of the hadronic cores of cosmic ray air showers. A large component of these showers are muons. Multiple parallel muon tracks seen in a single event with the NOvA detectors result from the same primary cosmic ray collision in the upper atmosphere. In order to use these muon bundles to probe the cosmic ray physics involved, we determine event characteristics such as the multiplicity of observed multiple muons, the effective area of the detector, the angular resolution of the detector, the scattering of individual muons, and the effectiveness of identifying and isolating these parallel muon shower events from background and noise.

The Evolution of Presidential Unilateral Powers and Congressional Reaction Mechanisms

Rachel Surminsky, CURO Research Assistant
Dr. Michael Lynch, Political Science, School of Public & International Affairs

Congress is actively seeking a means to thwart the expansion of presidential powers by barring unilateral action. President Obama's adjustments to the implementation timeline of the Affordable Care Act rollout in regards to employer mandate waivers catalyzed Speaker John Boehner to purpose a House Resolution authorizing a lawsuit against Obama. We explore the following question: can the federal courts impede presidential executive actions? Assessing factors derived through the analysis of precedent setting legal decisions, we outline the necessary components for a successful lawsuit against the president through the context of Speaker Boehner's pending lawsuit. Through our research, we have found that suing the president is not a productive means

of blocking executive expansion; federal courts will avoid ruling on inter-branch conflict unless all other efforts for resolution have been exhausted.

Assembly of a Dual-Selection Cassette for Gene-Specific Targeting by CRISPR/Cas9 to Recapitulate Dystroglycanopathies

Noreen Syed, CURO Research Assistant
Dr. Aaron Beedle, Pharmaceutical & Biomedical Sciences, College of Pharmacy

Secondary dystroglycanopathies are a class of muscular dystrophies in which the glycosylation of α-dystroglycan is aberrant. Fukutin is necessary for functional glycosylation of α-dystroglycan; however, its specific activity is unknown. Mutations in the *FKTN* gene lead to a secondary dystroglycanopathy called Fukuyama Congenital Muscular Dystrophy. In order to further the research on secondary dystroglycanopathies, we seek to develop a *Fktn*-knockout skeletal muscle cell line for *in vitro* work to complement *in vivo* studies. To increase the flexibility and utility of the cell line, we designed a strategy using homolog-directed repair to modify the *Fktn* locus using CRISPR/Cas9 technology. Therefore, the purpose of our current work is to create a dual-selection cassette plasmid for genome editing. The completed targeting plasmid will be used to promote homologous recombination to disrupt the *Fktn* gene of C2C12 cells using CRISPR/Cas9 technology.

The Relationships between Dietary Protein Intakes and Cortical Bone in Prepubertal Black and White Boys and Girls

Jordan Sylvester, CURO Research Assistant
Dr. Richard Lewis, Foods & Nutrition, College of Family & Consumer Sciences

Understanding the nutritional determinants of bone mass and strength during growth is essential since the majority of bone mass is accumulated by late adolescence. While calcium and vitamin D have been the primary nutrients studied, little is known about protein intake and bone in children. The purpose of this study was to determine relationships between dietary protein and bone measures in black and white boys and girls in the early stages of puberty (9-13 years of age; N=323) who participated in a vitamin D supplementation trial. Dietary protein (g/day) was determined using three-day diet records (Food Processor v.9.7.3). Tibia and radius cortical bone was measured at 66% from the distal growth plate via peripheral quantitative computed tomography (Stratec XCT 2000). There were no significant correlations between dietary protein and skeletal measures when accounting for race, sex, maturation, and energy intake. Using a cutoff of 1.2 g/kg body weight (bw)/day, high (HP; >1.2g/kg/bw) and low (LP; < 1.2g/kg/bw) protein intake groups were created. Protein intake in the LP group was correlated with cortical bone mineral content and cortical bone area at the tibia, and with total bone area, periosteal circumference, endosteal circumference, and strength strain index at the tibia and radius ($r=0.413$-0.271, all $p<0.05$). Protein intake in the HP group correlated with radial cortical thickness ($r=0.155$, $p=0.037$) only. These results indicate that dietary protein intakes between 0.8-1.2 g/kg bw/day, but not higher intakes, may be advantageous for cortical bone strength; however, dose-response intervention studies are needed to confirm this.

The Effects of Interval versus Continuous Conditioning on Physiological and Kinematic Parameters of Equine Fitness

Lindsey Taylor, CURO Research Assistant
Dr. Kylee Duberstein, Animal & Dairy Science, College of Agricultural & Environmental Sciences

Interval conditioning is a method of training which alternates between varying degrees of effort and is frequently used to train elite human athletes. The objective of this study was to determine kinematic and physiological changes of equines in response to either interval or continuous conditioning. Nine unconditioned horses were randomly divided into either a continuous conditioning (CC) or interval conditioning (IC) group. Both groups underwent a conditioning program of increasing workloads 3 times a week for 8 weeks. Horses were evaluated before and after conditioning to establish fitness levels for comparison. Both groups showed improved fitness following 8 weeks of training as measured by a decrease in peak blood lactate post SET. The IC group had a significant decrease in peak blood lactate levels post SET as compared to the CC group ($P<0.05$). Resting hematocrit levels increased for both groups following 8 weeks of conditioning; however, IC horses showed a significantly lower increase in hematocrit levels post SET as compared to CC horses ($P<0.05$). Kinematic analysis of horses at the trot showed shorter hind stance times post training for IC horses only ($P<0.05$) with no significant change in swing time for either the front or hind limbs. IC horses also had a longer period of suspension at the trot post training as compared to CC horses ($P<0.05$). Results from this study suggest that interval conditioning may be more effective as compared to continuous conditioning, indicated by improved physiological response to exercise as well as improved muscular propulsion.

Role of tRNA Nucleotidyl Transferase and 3' Exonucleases in the Biogenesis of Functional tRNAs in *Escherichia coli*

Fahim Thawer, CURO Research Assistant
Bijoy Mohanty, Research Scientist
Dr. Sidney Kushner, Genetics, Franklin College of Arts & Sciences

All mature tRNAs in both the eukaryotes and prokaryotes contain the CCA trinucleotide at their 3' termini, which is required for aminoacylation so that they can function in protein synthesis. In *E. coli*, all of the 86 tRNAs have the CCA determinant encoded in the genome. Accordingly, the gene (*cca*) encoding the tRNA nucleotidyl transferase, the enzyme responsible for adding CCA, is not essential in *E. coli*. It is thought that the enzyme works to repair tRNAs that have been processed incorrectly by the 3'→5' exoribonucleases such as RNase T (*rnt*) and RNase PH (*rph*) so that the CCA determinant is no longer intact. The data in this report show that *E. coli* lacking the CCA adding enzyme grows more slowly compared to a wild type control strain. The growth rate improved significantly in a *cca Δrnt* double mutant compared to a *cca rph-1* double mutant. Additionally, the growth rate of a *cca rph-1 Δrnt* triple mutant was not better than the *cca Δrnt* double mutant. These data suggested that RNase T may be responsible for overprocessing the tRNA 3' ends in the absence of the CCA adding enzyme. Northern analysis will be carried out to identify tRNAs with shorter 3' ends. In addition, the 3' and 5' ends of these tRNAs will be cloned and sequenced to confirm potential defects in their processing. This work was supported in part by a grant from the National Institutes of Health (GM081554) to S.R. K.

The Effects of Travel on Team-Based Performance

Parker Thomas, Rebekah Trotti, Christopher Morgan, Kyle Ledesma
Dr. Karl Kuhnert, Psychology, Franklin College of Arts & Sciences

We examined the relationship between distance traveled to work and job performance. As teams in the workforce are required to go on longer trips, the impact of travel is becoming more relevant. Current research indicates that travel induces stress,

but there has been little to no research on how travel influences job performance. Using team-based sports data, we examined the relationship between distance traveled and job performance. In addition, we evaluated how the total accumulated miles that teams travel impacts the relationship between travel and performance. Similarly, we looked at how a team's average job experience affects the relationship between travel and performance. Our study shows that the further that teams travel for their job, the worse they perform. However, our research indicates that employees are less sensitive to trips the more miles they have traveled. The findings of our study are important because there are tangible consequences of travel for one's job. Based on our findings, employers should seek alternative methods for long distance work. However, if travel is inevitable, organizations should be aware that with more trips the negative effects of traveling are weakened. Organizations can further reduce these adverse effects by selecting teams with more average job experience.

American Film's Portrayal of CEOs: An Increase in Complex and Confusing Personalities from the 1930s

Erin Todd
Dr. Fran Teague, Theatre & Film Studies, Franklin College of Arts & Sciences

In Industrial/Organizational Psychology, great strides are being made to help companies derive an equation for the perfect CEO, but one variable is rarely discussed in the literature: the media. Although a CEO may possess all the qualities for success, without media support her company's success may be capricious. This study seeks to uncover media's portrayal of CEOs as a means to educate both CEOs and the public about the effects media has on leaders. In order to examine media's effects, popular films containing CEOs were analyzed. A standardized method was used to select each film: the top-grossing films of each decade (starting in the 1930s) that contained a CEO as a lead character were selected; then, each CEO was analyzed based on physical characteristics, personality traits, actions, decision-making skills, and various other qualities. Results suggest that CEOs in popular films have become more complex and enigmatic. Older films portrayed CEOs as strictly "good" or "bad," whereas current films characterize CEOs as morally ambiguous, a mixture of good and bad. Taking these results into account, it appears that CEOs should make themselves more available and open to the public regarding their companies and their personal lives. Implications of this study may be used to provide CEOs with feedback of how to establish a positive image with their companies and with the public.

Pretreatment of Cellulose Powder and Nanocellulose Gel Production

Lauren Tolbert, CURO Research Assistant
Dr. Suraj Sharma, Textiles, Merchandising & Interiors, College of Family & Consumer Sciences

Cellulose, the most abundant natural polymer, is found in lignocellulosic raw materials like wood or fibrous plants, having applications including biomedical films that relieve burn victims' pain and car parts made from cellulose-based composites. Although cellulose is naturally easily accessible, extracting its fibrils from wood, cotton, and other natural forms and separation from hemicellulose, lignin, and other components is difficult. Once extracted, size reduction through mechanical and/or chemical processing to a nano-level produces nanocellulose in microfibrillatd (MFC) or nanocrystalline (NCC) form. MFC is mechanically produced using high pressure and shear force from homogenizers or microfluidizers, resulting in lateral dimensions of 5-20 nanometers. Pretreating cellulose pulp

by carboxymethylation, refinement, or addition of specific salts allows mechanical processing of nanocellulose to produce uniform, engineered nanofibril structures. Processing includes knife milling wood pulp sheets in three cycles to form hydrophilic powder. Thermogravimetric analysis determines weight loss due to bound water under a temperature scan (room temperature to 500 deg. C), and scanning electron microscopy (SEM) reveals morphological changes and particle sizes. Pulp cellulose powder is combined with water and carboxymethylcellulose (CMC) to form slurry, which is heated, then cooled to specific temperatures before homogenization, which transforms pulp powder cellulose dispersion to nanocellulose gel. High-energy consumption and harsh chemicals during processing and pretreatment could have substantial economic and environmental impact. Therefore, this research seeks to discover processing and pretreatment methods that optimize gel ratios and characterize nano-gel properties (rheology, morphology and adhesion). Future studies involve structure-property relations and economical and efficient nanocellulose gel production.

Truth & Testimony

Margaret Touchton, CURO Research Assistant
Dr. Andrew Owsiak, International Affairs, School of Public & International Affairs

Truth and Reconciliation Commissions (TRCs) are a form of transitional justice that are meant to be a method of healing for divided nations that have endured civil wars, internal strife, and human rights abuses. TRCs usually focus on creating a dialogue among victims, perpetrators, bystanders, and all those in between in the hopes of reconciling the nation's differences. In these dialogues, an emphasis is placed on obtaining a whole and complete truth from all involved in the conflict or abuses so that a better understanding of the issues can be formed and past grievances can be addressed. TRCs became internationally renowned after the post-apartheid government in South Africa created a TRC to examine human rights abuses that occurred during apartheid. The South African TRC has been widely celebrated as a success and has become a model for transitional justice. Despite the popularity of TRCs, there is still debate over their effectiveness. This paper will explore how well TRCs engaged a specific segment of the population, women. If a TRC's goal is to achieve reconciliation amongst the entire population by establishing a greater truth, then it is important to include the entire nation in the process, which means creating a space for women to tell their stories. Thus my research will attempt to answer the following question: Does the mandate of a TRC affect the subject of women's testimony? I plan to determine this by examining the mandate and testimonies from three TRCs (South Africa, Sierra Leone, and Liberia).

Fostering Peaceful Nuclear Infrastructure Sharing in Southeast Asia

Thomas Trahan, CURO Research Assistant
Dr. Sara Kutchesfahani, International Affairs, School of Public & International Affairs

Recent history has generally been favorable towards Southeast Asian economies, and expansion is expected to continue. As Southeast Asian GDPs rise, so too will regional energy consumption, and states will need to examine new strategies for meeting the rising demand. Peaceful nuclear energy is one such strategy, but only three Southeast Asian states include it in current official policy: Indonesia, Malaysia, and Vietnam. This study investigates how the ten member states of the Association of Southeast Asian Nations (ASEAN) could use their regional intergovernmental organization to promote development of peaceful nuclear energy

throughout the region by means of nuclear infrastructure sharing. It first examines case studies of peaceful regional nuclear cooperation through EURATOM in Europe and ABACC in South America. It will then provide an overview of the current status of nuclear energy in all ten ASEAN states, revealing wide disparities not only in nuclear energy policy but also states' respective histories with non-energy-related nuclear infrastructure. Finally, it will provide recommendations for how ASEAN can grow ASEANTOM, its organ of nuclear safeguards cooperation, in order to address these infrastructure disparities. These recommendations draw on enduring lessons found in the aforementioned case studies, mainly: 1) the effectiveness of a simple, narrowly-defined institutional mandate as demonstrated by EURATOM, and 2) the importance of groups of experts and sustained dialogue as demonstrated by ABACC. Although economic factors are also at play, implementing a collective, infrastructure-focused approach could contribute towards a more equitable nuclear energy future for Southeast Asia.

The Src Homology 3 Binding Domain is required for Lysophosphatidic Acid 3 Receptor-Mediated Cellular Viability in Melanoma Cells

Sterling Tran, CURO Research Assistant
Dr. Mandi Murph, Pharmaceutical & Biomedical Sciences, College of Pharmacy

The LPA3 receptor is a G protein-coupled receptor that binds extracellular lysophosphatidic acid and mediates intracellular signaling cascades. Although we previously reported that receptor inhibition using siRNA or chemical inhibition obliterates the viability of melanoma cells, the mechanism was unclear. Herein we hypothesized that amino acids comprising the Src homology 3 (SH3) ligand binding motif, R/K-X-X-V/P-X-X-P or (216)-KTNVLSP-(222), within the third intracellular loop of LPA3 were critical in mediating this outcome. Therefore, we performed site-directed mutagenesis of the lysine, valine and proline, replacing these amino acids with alanines, and evaluated the changes in viability, proliferation, ERK1/2 signaling and calcium in response to lysophosphatidic acid. Our results show that enforced LPA3expression in SK-MEL-2 cells enhanced their resiliency by allowing these cells to oppose any loss of viability during growth in serum-free medium for up to 96 h, in contrast to parental SK-MEL-2 cells, which show a significant decline in viability. Similarly, site-directed alanine substitutions of valine and proline, V219A/P222A or 2aa-SK-MEL-2 cells, did not significantly alter viability, but adding a further alanine to replace the lysine, K216A/V219A/P222A or 3aa-SK-MEL-2 cells, obliterated this function. In addition, an inhibitor of the LPA3 receptor had no impact on the parental SK-MEL-2, 2aa-SK-MEL-2 or 3aa-SK-MEL-2 cells, but significantly reduced viability among wt-LPA3-SK-MEL-2 cells. Taken together, the data suggest that the SH3 ligand binding domain of LPA3 is required to mediate viability in melanoma cells.

Modeling a Baseline of Forest Energetics: A Method for the Evaluation of Sustainable Practices and Technologies

Mathieu Trunnell, CURO Research Assistant
Dr. John Schramski, College of Engineering

Sustainability metrics most often quantify biogeochemical flows such as nitrogen, carbon, and water. However, energy is also a finite resource. In order to consider acceptable energy consumption limits, appropriate ecosystem-based benchmarks must be derived. Can reasonable energy balance models be created from existing ecosystem data to appropriately develop a balanced thermodynamic model of a typical ecosystem? To test this question, I propose to develop an input-output energy model of

UGA's Driftmier Woods. This study uses data from peer-reviewed literature as well as those gathered by a team of student researchers from UGA's School of Ecology, the College of the Environment and Design, and the College of Engineering to propose a baseline energy input-output computational model describing natural energy flows into and out of these woods, including but not limited to the yearly insolation, biomass accumulation (i.e., spring and summer), biomass loss (i.e., fall and winter), and eventual heat degradation. Driftmier Woods is an old-growth forest with little to no new ongoing year-to-year increase in biomass storage and as such, we model the woods as a steady-state system where the energy inputs are equal to the outputs over a one-year cycle. If successful, this benchmark study of expected energy flows can be used to evaluate prescribed grazing methods currently being proposed to eradicate invasive species and ultimately determine if this is an energetically sustainable practice. This represents an entirely novel means to compare the sustainability of a manmade process or technology to the balanced ecosystem energetics of the biosphere.

The Effects of TNFR1 and TNFR2 on Low Birth Weight as Seen in Malaria-Infected Mice Models

Ha Truong, CURO Research Assistant
Dr. Julie Moore, Infectious Diseases, College of Veterinary Medicine

Placental malaria is a condition where malaria-infected erythrocytes and mononuclear cells, namely macrophages, sequester within the intervillous spaces of a pregnant woman's placenta. In the malaria endemic regions of Sub-Saharan Africa, women experiencing placenta malaria often give birth to babies of low birth weight (LBW), a condition that greatly increases the mortality of these babies as compared to normal weight babies. Poor pregnancy outcomes such as LBW correlate with high levels of inflammation and Tissue Necrosis Factor (TNF), a pro-inflammatory cytokine produced mostly by macrophages. In the Moore laboratory, I am assisting in a project that will observe effects of Tissue Necrosis Factor (TNF) on pregnancies experiencing placental malaria and observe how TNFR1 and TNFR2, receptors 1 and 2 for TNF, are activated in this relationship. We will establish a mice model where pregnant C57BL/6J mice infected with *Plasmodium chabaudi* on day 0 of pregnancy. Up to the tenth day of gestation for the C57BL/6J mice, daily clinical measurements of weight, hematocrit, and parasitemia will be taken. On the tenth day, the mice will be sacrificed and their placentas preserved by fresh frozen in liquid nitrogen for RNA and protein isolation and in neutral buffered formalin for histology. By observing how TNFR1 and TNFR2 affect mice pregnancy, we can evaluate if TNF will be a valuable detector of malaria during pregnancy.

Health Care Policy Evaluation: A Case Study Examination of Workplace Wellness

Abby Tyre, CURO Research Assistant
Dr. Marisa Pagnattaro, Director, Legal Studies Certificate Program, Terry College of Business

The health care industry is one that touches the lives of all individuals as health is a universal principal, encompassing all humans. Currently the US spends approximately 17.9% of its GDP on health care expenditures, translating into $2.9 trillion dollars each year. Yet as health care expenditures are exponentially increasing, quality nor quantity of care is improving. This disparity creates a societal need for drastic health care policy reform. Reform came on March 23, 2010, when the Patient Protection and Affordable Care Act (ACA) was passed into law. The ACA is the policy reform designed to expand health care coverage and health insurance for

all Americans. One component of this legislation includes a $10 billion dollar budget for workplace wellness. The ACA defines wellness as "a program offered by an employer that is designed to promote health or prevent disease." The design of this present study is to produce a policy evaluation of the ACA's expansion of workplace wellness using a thorough review of cost-benefit analysis. Evaluation will occur by comparing and examining several case studies of workplace wellness: small businesses, large businesses, as well as at the University of Georgia. By examining several direct examples of workplace wellness, a conclusion can be made about both financial benefit as well as health benefits including improvement to community health, reduction of health disparities, and reduction of health costs. It is predicted that the ACA's workplace wellness impact will have positive long term health impacts but few financial benefits.

Response of Stream Biofilms across an Urbanization Gradient

Rachel Usher, CURO Research Assistant
James Wood, Graduate Student
Dr. Amy Rosemond & Dr. Seth Weger, Odum School of Ecology

This study examined 30 sites from 2010-14 investigating stream biofilms response to urbanization in Athens-Clarke County, GA. Urbanization initiates cascading environmental stressors impacting stream systems altering abiotic factors including hydrology and water chemistry. Biofilm, the active biological surface on stream bottoms comprised of algae, bacteria, fungi and organic matter, integrates the effects of multiple stressors. Thus, biofilm characteristics including its biomass and nutrient content can indicate the effects of watershed land use on stream condition. We determined watershed land cover and used physical/chemical data provided by Athens-Clarke County to examine biofilm response. We found a positive correlation between impervious surface cover (%ISC) and total nitrogen (TN), dissolved inorganic N, and temperature of stream water. An isotope of N, 15N is typically found in higher quantities in streams with wastewater inputs. Total phosphorus was positively correlated with δ15N, suggesting sewage or wastewater input but surprisingly, there was a negative relationship between biofilm δ15N and %ISC. The δ15N response to forest cover yielded expected values (3-4) in heavily forested areas (>60%), increased values (4 – 9) in moderately forested areas (30-60%), and decreased values (>2.5) in reduced forest area (>15%). These findings suggest that land uses can differentially affect inputs and cycling of N in biofilms, resulting in non-linear relationships between potential source indicators (e.g., δ15N) with single types of land cover change.

Using Model-Based Analysis to Develop a More Robust Measure of Flow-Mediated Dilation

Charles Van Brackle
Dr. K. Melissa Hallow, College of Engineering

Cardiovascular Disease (CVD) is the leading cause of death in the United States. The endothelium is responsible for controlling the dilation and contraction of arteries through control of smooth muscle tone in response to shear stresses. Endothelium dysfunction is an early indicator of atherosclerosis and can predict CVD before it becomes more seriously developed. Ultrasonic assessment of brachial artery flow is used to non-invasively study flow-mediated dilation (FMD) and the function of the endothelium. Currently, FMD is unable to explain variability in the dilatory response due to differences in shear response and other physiological factors in different subjects. We are developing a mathematical model to characterize the relationship between shear stress and the flow-mediated dilatory response, and also account for

varying physiological factors among subjects. This is done in two parts: by modeling the velocity profile observed via ultrasound, and then modeling the blood vessel's dilatory response to that velocity/shear profile. The diameter is modeled as a function of the shear stress on the interior of the brachial artery by an exposure-response relationship. The model seeks to establish parameters that describe the underlying physiological response to shear and that account for physiological variability between subjects. This will remove confounding effects and enable the FMD test to more accurately identify physiological markers that indicate the subject's risk for CVD, improving the clinical utility of this measurement.

Visual Brand Identity on Pinterest

Haley Vann, CURO Research Assistant
Dr. Jhih-Syuan Lin, Grady College of Journalism & Mass Communication

In response to the growing popularity of Pinterest among consumers, global brands have expanded their marketing efforts into the visual wonderland, aiming to build visual brand identity and create a deeper engagement with their consumers. Pinterest is considered an essential social media outlet because consumers on Pinterest are actively seeking and including brands in their possible selves and selecting brands that appear to advance their evolving taste regimes. Considering this, the current research project aims to explore global brands' visual brand identity presentations on Pinterest. As the literature suggests, brand identity is a unique set of associations that a brand aspires to create or maintain. It is the holistic look, feel and style of a brand. The essentials of a brand's visual brand identity include its logo, shapes, colors, typography, location, character and styles. These elements must be cohesive across all platforms to unify the brand and should correlate with the brand's identity so that it emphasizes the brand's core values and philosophies. In order to answer our overarching research question—does brand identity helps facilitate the development of consumer-brand relationships? — we first develop a comprehensive conceptual framework of visual brand identity based upon literature on visual representations in advertising. We then collect data from top 100 global brands' Pinterest official accounts and conduct a content analysis. Specifically, we systematically code samples into categories that deal with brand, board, pin and image level. It is our belief that this research project will provide important insights into visual brand identity development and image-based content strategies useful to advertisers and marketers.

Gender as a Moderator of Work-Family Conflict Coping Strategies

Juhi Varshney, CURO Research Assistant
Dr. Malissa Clark, Psychology, Franklin College of Arts & Sciences

Work-family conflict is pervasive among both men and women (e.g., Gutek et al., 1991). Accordingly, the use of coping strategies in alleviating this conflict has been well documented (e.g., Clark et al., 2014). Prior research shows that gender may affect an individual's work-family conflict (e.g., Gutek et al., 1991), but little research has examined how gender influences the type and the frequency of coping strategies that individuals use. The purpose of this study is to explore the role gender plays in coping with work-family conflict, by specifically examining gender differences in the use of coping strategies. Furthermore, it examines gender as a moderator in the relationship between coping strategies and work-family conflict, as well as whether gender influences the relative importance of these coping strategies. This study collected data from 301 individuals who worked at least 35 hours per week. Multiple regression results showed gender differences

in the use of several coping strategies, with women using certain coping strategies more than men. Specifically, gender moderated the relationship between the coping strategy of exercise and work-family conflict, and the relationship between exercise and burnout. These strategies appeared to be more beneficial for women compared to men. However, relative importance analyses indicated that the relative importance of the coping strategies in relation to work-family conflict did not vary by gender. This research helps advance our understanding of the relationship between gender and work-family conflict coping strategies and has the potential to help men and women better cope with work-family conflict.

Analysis of Heparan Sulfate Fragments by NMR Spectroscopy

Rachel Vecchione
Dr. James Prestegard, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Heparan sulfate (HS) is a glycosaminoglycan (GAG) composed of repeating dissacharide units of glucuronic acid (GlcA) or iduronic acid (IdoA) and N-acetylglucosamine. These sugar (or glycan) reisdues are attached through an α1-4 glycosidic linkage from GlcNAc to the uronic acid and a b1-4 linkage from the uronic acid to the next GlcNAc. Sulfation can occur at the 2 position on the uronic acid, the 4 position on the N-acetylglucosamine and the N position on the N-acetylglucosamine. Heparan sulfate is attached to proteoglycans like glypican in the extra cellular matrix of cells where it has an important role in cell to cell interactions. Understanding how heparan sulfate binds to its substrates may increase the ability of pharmaceutical science to capitalize on the regulatory function of heparan sulfate and manipulate it to control certain interactions that may have an effect on biological processes which cause disease. To begin my studies, heparan sulfate was isolated from 15N labeled glypican through digestion with Heparinase II. The oligosaccharides produced from the digestion were separated using size-exclusion chromatography. The fractions (from the size-exclusion column) were then checked for UV absorbance at wavelengths of 194nm, 203nm and 214nm. The fractions showing high absorbance were consolidated and characterized using NMR spectroscopy. 15N is an NMR active nucleus normally found at a very low natural abundance. An ability to isolate HS fragments enriched in this isotope facilitates future observation of HS interactions in biological systems.

The Mini-FLOTAC: An Analysis of a Novel Fecal Egg Counting Technique

Emily Vermillion, CURO Honors Scholar
Dr. Ray Kaplan, Infectious Diseases, College of Veterinary Medicine

Measuring the numbers of worm eggs per gram of feces is important for estimating levels of parasite infections and for assessing anthelmintic drug efficacy. There are several different methods for performing fecal egg counts (FEC), with each having certain advantages and disadvantages. The Mini-FLOTAC is a recently developed novel device used to perform FECs that is designed for both ease of use and higher sensitivity than the commonly used McMaster FEC technique. There are two primary goals of this study: (1) to assess the accuracy, precision, and sensitivity of the Mini-FLOTAC compared to the two other most commonly used FEC techniques, the modified McMaster and the modified Wisconsin; and (2) to assess the overall ease of use and efficiency of the device. To assess the precision and accuracy of the three methods, a simulated fecal egg count reduction test was performed using fecal samples from horses, cattle, and goats. Overall ease of use was assessed by evaluating the ability to see the eggs under the microscope with clarity, and measuring the

amount of time needed to perform the three different methods. Though Mini-FLOTAC is designed for ease of use, we found a decreased sample clarity with the mini-FLOTAC causing an increase in the time required to count the eggs. This was especially a problem when analyzing feces from goats. Experiments investigating the accuracy, precision, and sensitivity are still in progress.

The Influence of Appeal on Overconsumption

Kelsie Walker
Dr. Michelle vanDellen, Psychology, Franklin College of Arts & Sciences

Overconsumption is a form of low self-control; we aimed to discover what factors might predict this behavior. To analyze this question, we asked participants to eat a sample of four types of cookies (sugar, chocolate chip, mint chocolate, and pumpkins spice). They were told that while they needed to eat at least some of each cookie, they were welcome to eat as much as they would like. Each participant was given a plate with 24 cookies (6 of each type). We manipulated the appeal of the cookies by heightening the cookies' aroma and freshness. We did this by randomly splitting the participants into one of two conditions. In the baking condition, experimenters freshly prepared cookies using a portable oven in the same room as the participants completed all study tasks. In the non-baking condition participants tasted day-old cookies. Once the participants were brought to the study room, they completed a questionnaire while they ate the cookies. The questions asked the participants about their current mood, their feelings toward the cookies, how many cookies they felt they should eat, and demographics. A *t* test revealed that overconsumption was higher on the baking versus non-baking days. The results indicate that while appeal does not cause overconsumption, it does have a positive effect on enhancing overconsumption. Implications for reducing overconsumption will be discussed.

The Prevalence of Hemoparasites in Seabird Populations on Middleton Island, Alaska

Morgan Walker, CURO Research Assistant, CURO Graduation Distinction
Dr. Michael Yabsley, Warnell School of Forestry & Natural Resources

In recent years, the nesting seabirds of Middleton Island, Alaska have experienced severe population declines. Since blood parasites have previously been shown to negatively impact the survival and reproductive success of their avian hosts, hemoparasitism may be a factor contributing to these population declines. The purpose of this research was to determine the prevalence of hemosporidian parasites in the seabird community of Middleton Island, with an emphasis on the relative prevalence of parasites of the three genera *Plasmodium*, *Haemoproteus*, and *Leucocytozoon*. From June to August 2014, we collected 290 blood samples from adult Black-legged Kittiwakes, Pelagic Cormorants, Rhinoceros Auklets, Common Murres, and Tufted Puffins. Presence–absence and parasitemia values of hemoparasites were determined through microscopic evaluation of peripheral blood smears. Of the 70 Black-legged Kittiwake and 50 Pelagic Cormorant smears analyzed thus far, no hemoparasites have been identified. The absence of hematozoa in seabirds is unusual, but not unprecedented. There could be several explanations for this absence, including the displacement of potential dipteran vectors by ectoparasites, low hemoparasite prevalence in the area, or protective immunity of the hosts. Since blood smear analysis is presently ongoing, a pattern may still emerge that could provide more explanation into the apparent lack of hemoparasites in the Middleton Island seabird community.

Using Artificial Neural Networks to Predict Solar Radiation in Georgia

Emily Wall, CURO Research Assistant
Dr. Walter Potter, Computer Science, Franklin College of Arts & Sciences

The Georgia Power Advanced Solar Initiative set a target for Georgia Power to obtain 210 megawatts of contracted solar capacity within two years. We implemented an Artificial Neural Network (ANN) on behalf of Georgia Power to predict solar radiation at various locations across the state. We utilized weather data collected from the Georgia Automated Environmental Monitoring Network (AEMN) including temperature, humidity, wind speed, and past values of solar radiation. We then analyzed the prediction error produced from various combinations of input fields in order to produce the most accurate predictions and optimize the performance of our model. We found that input fields day, time, and previous values of solar radiation were the most significant in predicting solar radiation. We ultimately obtained a model with mean-squared error (MSE) of 0.004382. The resulting model will be used to make decisions regarding the optimal placement of solar collection facilities in order to reach the goal of 210 megawatts of contracted solar capacity.

High-Fat Diet Consumption and Behavioral Dysfunction: What Are the Roles of Maternal vs. Post-Weaning High-Fat Intakes?

Matthew Weber
Saritha Krishna, Graduate Student
Dr. Nick Filipov, Physiology & Pharmacology, College of Veterinary Medicine
Dr. Donald Harn, Infectious Diseases, College of Veterinary Medicine
Dr. Claire de La Serre, Foods & Nutrition, College of Family & Consumer Sciences

Obesity, caused in part by high-fat diet consumption, is a major public health concern associated with metabolic and neurological dysregulations. Obesity is growing rapidly amongst the youth. Since children may be affected by the maternal and/or their own diet, we conducted a study where female mice were fed low-fat (LFD) or high-fat (HFD) diets beginning six weeks prior to conception through weaning (postnatal day [PND] 21). To determine pre- vs. post-weaning dietary effects, pups were gender-separated and weaned onto a LFD or HFD. The offspring then went through a series of behavioral tests beginning on PND70. In a forced swim test we found that males with post-weaning HFD swam significantly more, suggesting increased anxiety; only female mice on HFD both pre and post-weaning exhibited a trend towards increased swimming. Additionally, novel object recognition test was used to assess recognition memory. Females that were on HFD pre or post-weaning, but not both, did not show novel object preference. The preference for the novel object in all dietary treatments was not affected in the male offspring, suggesting a gender-specific offspring susceptibility to HFD. In a marble burying test another gender-bias arose. Males on HFD post-weaning exhibited higher burying activity. In contrast, the pre-weaning HFD significantly increased the marble burying by female offspring. While still under analysis, some thought-provoking relationships are emerging from these data. When it comes to anxiety-like behavioral aberrations, maternal diet may be of greater importance to female offspring whereas the postnatal diet may be more important for males.

Molecular and Genetic Analysis of the Ab10 Meiotic Drive Haplotype in Maize and Teosinte

Amy Webster, CURO Graduation Distinction
Dr. Kelly Dawe, Genetics, Franklin College of Arts & Sciences

In *Zea mays*, abnormal chromosome 10 (Ab10) exhibits meiotic drive by segregating into 65-80% of progeny instead of the Mendelian 50%. Ab10 differs significantly from normal chromosome 10 (N10) primarily due to the presence of a distal tip of unknown origin and heterochromatic regions called knobs. Three haplotype variants of Ab10 have been found across subspecies of *Zea mays* called teosinte, the wild progenitor of domesticated maize. They are denoted types I, II, and III and vary in knob content, but all exhibit meiotic drive in maize. The three main goals of this study were to determine genes that could be important for causing meiotic drive, to analyze Ab10 variants in teosinte, and to show that Ab10 exhibits meiotic drive in teosinte. To do this, I first utilized gene conservation principles and expression level analyses to determine three genes that may be important for causing meiotic drive to occur. One of these, a kinesin, is of particular interest and studies of this gene are ongoing. To analyze Ab10 in teosinte subspecies, I first identified plants positive for Ab10 in four teosinte subspecies. I then followed up with one of these, *Zea mays parviglumis*, and used fluorescent *in situ* hybridization (FISH) to identify Ab10 type II in this plant. Then, since Ab10 has only been shown to exhibit meiotic drive in maize and not teosinte, I showed that meiotic drive occurs in *Zea mays parviglumis*.

Does Georgia's Voter Identification Law Disproportionately Affect African American Voter Turnout in Georgia?

Hannah Weiss
Dr. Anthony Madonna, Political Science, School of Public & International Affairs

There is presently a great deal of controversy surrounding voter identification laws throughout the United States. These laws require voters to present some form of identification at a polling place in order to vote. Opponents point to a disproportionate negative impact on voter turnout among minorities, and liken these laws to Jim Crow-era disenfranchisement tactics. Supporters cite examples of voter fraud to justify their necessity. Claims that minority voters are disproportionately affected by voter identification laws may have serious implications for the integrity of the political process in the United States. I expected my study, however, to find that Georgia's voter ID law has inconsequential disproportionate effects on minority voters. I examine the current state of voter identification laws throughout the nation and then turn specifically to Georgia and its voter ID law for a more comprehensive study. Georgia is an appropriate case to study due to its 'strict' voter ID law, the Secretary of State's compilation of turnout data based on race in Georgia, and Georgia's sizable minority population, which should make the results of the study generalizable to other states. Georgia's voter ID law was implemented in 2007, so the study examines white and African American voter turnout in the 2004, 2008, and 2012 presidential elections as well as the 2006 and 2010 midterm elections in order to examine the impact of the implementation of the voter ID law on African American voter turnout relative to white voter turnout in Georgia.

Antioxidant Potential of Anthocyanins in Micronized Tart Cherry Puree

Maddison Wenzel, CURO Research Assistant
Dr. Rakesh Singh, Food Science & Technology, College of Agricultural & Environmental Sciences

Antioxidants are defined as substances that prevent destructive chemical reactions involving the combination of oxygen and other materials in many processes foods. These substances help reduce free radicals, or by-products, that can lead to heart disease, diabetes and cancer. Fruits and vegetables are known to have a high content of antioxidant potential and when they are processed their

phytochemical and nutrient content is generally improved (Ou, 2012). Tart cherries are known to possess different chemical compounds that aid in increasing the overall biotic activities they perform. As far as concerns cherry anthocyanins, studies have demonstrated that they are able to reduce proliferation of human colon cancer cells in culture (Ferretti, 2010). Tart cherry products also possess *in vitro* anti-inflammatory activity and antioxidant capacity against diverse forms of oxidative and nitrosative stress (Ou, 2012). Based on theories such as this, the purpose of this study is to understand the different antioxidant potentials associated with tart cherry puree in relation to particle size. The overall experimental nature of this study was to evaluate the overall color, viscosity and total phenolic content. While comparatively testing the original sample in relation to the micronized sample to determine overall antioxidant potential changes. This information was recorded and analyzed to determine the following applicable results.

Identifying Leadership Qualities of Classroom Teachers for the Purpose of Guiding Pre-Service Teachers

Jane Whatley, CURO Research Assistant
Dr. Amy Heath, Language & Literacy Education, College of Education

In the education system, leadership roles were traditionally considered part of the administrative level, despite a disconnect between the policy and decision makers and the ones most effected – students. However, research has begun to change its focus on teacher leadership by examining how it pertains to those individuals communicating daily with learners – classroom teachers (Boyd-Dimock & McGree, 1995). Research has been used to collaboratively determine definitions and qualifications of a "teacher leader," but the findings do not communicate which specific leadership qualities those leaders possess. Therefore, the overall goal of this study was to identify which common *leadership qualities* are considered most important to teaching instruction in high school English Language Arts (ELA) classrooms. The research method consisted of a five-question electronic survey that asked current ELA certified educators about the leadership qualities they considered most valuable to teaching, the challenges that follow implementation of those qualities, and their professional experiences regarding teacher leadership. Collected data was analyzed by comparing individual selections of leadership qualities and challenges with years of teaching experience and the presence of any official or unofficial teacher leadership positions. A correlation between amount of teaching experience and preferred leadership qualities was expected, as well as a correlation between a presence of official or unofficial leadership positions and preferred leadership qualities. The data gathered from these surveys provided a better understanding of which leadership qualities allow teachers to be most successful in the school environment. Research findings will be presented to the UGA community to educate future educators about developing important leadership qualities in the classroom.

The Enigmatic Country: Analysis of Russian Expansionism in the Modern Age

Patrick Wheat, CURO Research Assistant, CURO Graduation Distinction
Dr. Sara Kutchesfahani, International Affairs, School of Public & International Affairs

Since the fall of the Soviet Union, the Russian Federation has held the international community in a state of almost constant confusion, with the Russian government's actions growing increasingly aggressive towards her neighbor nations over the past several years. A marked change that differentiates this growth from pervious Russian government actions towards their neighbors is an increased tendency to use

military force in engagements with their neighbor nations. To assist with international understanding of the indication factors which make a state more likely to be a target of Russian expansionism, analysis of past actions involving Russia and her neighbors were used to anticipate the key circumstances in which Russia is more or less likely to commit to military expansionism. After analysis of the case studies of Russia's individual relationship with the Republic of Georgia, the Republic of Poland and the Republic of Estonia, the primary indicators towards aggressive action by Russia are the existence of a Russian ethnic minority that claims to be oppressed and an active presence of Russia as an energy provider to that nation. The absence of one or both of these factors markedly reduces the likelihood of Russian expansionism in that country, giving a strong analysis towards the potential indicators of Russian aggression towards her neighbor states in the future.

The Relationship between CH, CO, and Dust in MBM 12

James White, CURO Research Assistant
Dr. Loris Magnani, Physics & Astronomy, Franklin College of Arts & Sciences

The high-latitude molecular cloud, MBM12, is a small, opaque, interstellar cloud below the Galactic plane, which harbors a small association of newly-formed stars. As one of the only high-latitude clouds that are currently forming stars, it is important to characterize its molecular gas and dust properties. We present for the first time a map of the 3.3 GHz emission line from the CH molecule. This molecular species is an excellent tracer of the low-density molecular gas in the cloud. We compare the CH emission to existing infrared maps of MBM 12, which trace the dust distribution. In this way, a comparison of the gas-to-dust ratio between MBM 12 and other small molecular clouds can be made. In addition, a comparison of the CH emission is made with the J=1-0 emission line of the CO molecule. We find that the correlation between CH and dust is excellent, while the correlation between CH and CO is not as robust. Our findings establish that MBM 12 has a lower gas-to-dust ratio than comparable, non-star forming interstellar clouds

An Examination of Two Different Instructional Approaches for Teaching Preservice Teachers Common Phoneme-Grapheme Relations

Jessy Whitenton, CURO Research Assistant
Dr. Kristin Sayeski, Communication Sciences & Special Education, College of Education

Matching phonemes (letter sounds) to graphemes (letters) is an important aspect of the alphabetic principle. Preservice teachers are typically not prepared in how to correctly produce letter sounds (Gormley & Ruhl, 2007). Lack of skill in the production of letter sounds makes it difficult for teachers to (a) identify student errors and (b) serve as a model for students when teaching beginning reading. The purpose of the study is to examine the effects of massed versus distributed practice on teacher candidates' (n = 49) learning of letter sounds. Specifically, the study will explore the concept of mastery learning posited by Benjamin Bloom (Bloom, 1971, 1976). Bloom's theory of learning was based upon the belief that all students can make learning gains when provided with the *necessary time* and *appropriate learning conditions*. Although the principle of mastery learning is not new and has been echoed in the recommendations of other instructional scholars (see Bransford, Brown, & Cocking, 2000; Rosenshine & Stephens, 1986), very few applications of this principle exist in teacher education. To establish appropriate learning conditions, the constant time delay in conjunction with electronic flashcards will be used for instruction. Specific research questions to be answered are: 1) Are there differences in learning outcomes associated with massed versus distributed practice for

teacher candidates learning concepts associated with the alphabetic principle and the correct pronunciation of phoneme-grapheme pairs in isolation? 2) Do conditions for learning, specifically, massed versus distributed practice, result in differences in maintenance of knowledge and skills? For the study, participants (n = 28) in the distributed condition will receive initial instruction (1.5 hours) plus weekly practice sessions (20 min in duration) over a period of 4 weeks for a total of 2.5 hours of instruction. Participants (n = 21) in the massed practice condition will receive a total of 2.5 hours in one session. Pretest, posttest, and maintenance data will be collected.

Quantifying Replicating and Latent CFPHV in Symptomatic and Asymptomatic Infected Turtles

Jordyn Whitfield, CURO Research Assistant
Annie Page-Karjian, Graduate Student
Dr. Nicole Gottdenker, Pathology, College of Veterinary Medicine

Fibropapillomatosis (FP) is a panzootic, neoplastic disease of marine turtles that is associated with an alphaherpesvirus called chelonid fibropapillomatosis-associated herpes virus (CFPHV). An open reading frame with sequence similarity to a latency-associated nuclear antigen (LANA) gene of Kaposi's sarcoma-associated herpesvirus was recently identified within the CFPHV genome. Here, we use necropsy findings and quantitative PCR (qPCR) data to identify and compare the presence, location, and quantities of CFPHV LANA (F-LANA) and DNA polymerase (*pol*) gene sequences in samples that were aseptically collected from 10 green turtle (*Chelonia mydas*) carcasses from Florida (5 with FP, 5 FP-free). Using genomic DNA extracted from 109 (current sample number) biological samples of various types including FP tumors, normal skin, heart, thymus, lungs, kidneys, spleen, liver, urinary bladder, blood, urine, and neurological tissues, including brain and spinal, optic, and peripheral nerves, quantities of each gene target will be evaluated via qPCR to determine whether certain tissue types are associated with relatively higher quantities of *pol* or F-LANA in symptomatic and asymptomatic green turtles. The DNA assay is ongoing; however, we expect to find a correlation between certain tissue types and stage of CFPHV infection (tumored versus infected turtles without tumors) as displayed by relative concentrations of *pol* versus F-LANA in each type. The results from this study are expected to provide valuable insight regarding the CFPHV life cycle including replication, viral loads and cell type infected, and potential sites of latency in turtles with and without FP tumors.

Influence of Maternal Diet on the Offspring Gut Microbiota

Brittany Whitlock, CURO Research Assistant
Dr. Claire de La Serre, Foods & Nutrition, College of Family & Consumer Sciences

An obesity epidemic currently plagues the U.S. and other western nations, threatening the health of millions across the globe. Research efforts over the last decade have pointed towards the gastrointestinal (GI) microflora having a potential role in the development and persistence of obesity and other metabolic disorders. The following study focuses on the inheritance of obesity from mother to child, and asks whether the inheritance of unhealthy GI microbiota could be the vehicle that increases offspring propensity towards metabolic disease. Female C57BL/6 mice were fed either high-fat (HF) or control low-fat (LF) diets for 6 weeks prior to mating and remained on their respective diets throughout pregnancy and lactation. Pups were weaned onto a control LF diet. Microbiota composition and gastrointestinal (GI) health were determined at different time points. This study focuses on the health of pups at post-natal date (PND) 21, who were weaning off of their mother's

milk. It was found that, at weaning, offspring of HF fed, obese dams displayed significant alterations in gut microbiota composition associated with impaired GI epithelial permeability. This microbial profile has previously been associated with obesity and could increase their propensity toward metabolic disorder later in life.

Reviving Our Roots: Reconnecting Teens to Agriculture

Elizabeth Wilkes, Foundation Fellow
Dr. Susannah Chapman, Anthropology, Franklin College of Arts & Sciences

The American farmer is growing older, the American agricultural system is unsustainable, and the American teenager is not interested in farming. The Green Revolution has led to increasingly industrialized and consolidated farms, leaving farmers and consumers starkly disconnected. A new generation of farmers is the key to building a sustainable food system in today's agricultural environment. While the latest Farm Bill promises to invest millions of dollars in beginning farmers, it fails to consider who and from where these new farmers are likely to come. High school students - the majority of whom live in urbanized areas - grow up with no cultural attachment to farming and are agriculturally illiterate. Following a literature review and discussions with community stakeholders, I propose that high schools at the rural-urban interface should implement farmer development programs to address the lack of new farmers. The rural-urban interface (RUI) presents a confluence of ideas, people, and spaces, which offers an opportunity to reimagine farming landscapes. Studies suggest that developing policy to support agriculture at the RUI is warranted, and the "metropolitan farmer" is a growing reality. Farmer development programs can restore intergenerational relationships, encourage transfer of knowledge, and foster more sustainable forms of agriculture, in addition to providing practical skills to teenagers who face an increasingly competitive job market. A model Young Urban Farmer development program in Athens, GA, demonstrates this potential. Further research, evaluation, and engagement should reveal additional insight and inform the creation of pilot programs and related policies in Athens and beyond.

Development of a Chimeric Chick Neural Tube Injury Model incorporating 3D, mESC-Derived Neural Aggregates

Elizabeth Wilkins, CURO Honors Scholar
Catherine Callaway, Foundation Fellow
Dr. Steven Stice, Animal & Dairy Science, College of Agricultural & Environmental Sciences

Due to low cost, availability, and *ex utero* development, the chicken embryo serves as the oldest vertebrate developmental model. During development, the primitive spinal cord, termed the neural tube, is patterned caudally by retinoid signaling, and ventrally by a gradient of Sonic Hedgehog (Shh), yielding five specific progenitor domains. The pMN domain gives rise to motor neurons (MN), which synapse on muscles. The other domains yield interneurons, which compose the premotor control circuit. This neural network is cumulatively responsible for controlling all muscle actuation.We generated three-dimensional aggregates of mouse embryonic stem cells (mESC) from a cell line expressing a green fluorescent protein behind a MN-specific promoter. The aggregates were patterned with retinoic acid and a Shh pathway agonist to mimic organotypic ventral neural tube development. The line also expresses channel rhodopsin-2, a light-gated cation channel, which triggers depolarization in neurons when exposed to blue light. We hypothesize that embryos will survive 72 hours post-injection, and that the aggregates, including optically active motor neurons, will integrate into the injured spinal cord. A portion of the neural tube of developing

chicks was removed *in ovo*, followed by microinjection of neural aggregates. After three days, embryos were inspected for survival and integration. Ultimately, we expect a light stimulus to MN will result in a visible motor response within the embryo. As seen in paralytic injuries, adult spinal tissue has limited regenerative properties, making cell replacement an attractive therapy. Here we provide the first steps towards making that a reality.

Physical Activity Effects on Social Physique Anxiety

John Williams, CURO Research Assistant
Dr. Ellen Evans, Kinesiology, College of Education

Social physique anxiety (SPA) is anxiousness and concern with the evaluation of an individual's own physique by others. Relationships have been seen between SPA and physical activity (PA). A negative correlation has been seen between SPA and CDC PA guideline fulfillments. This study measured pre and post SPA levels with the Social Physique Anxiety Scale 12 item questionnaire. Each participant engaged in a 6-week moderate aerobic or high intensity interval training exercise regiment. The primary aim of this study is to examine a possible reduction of SPA with exercise. This study's hypothesis is exercise will reduce SPA notably in a sample of overweight, college-aged females who were previously sedentary. This study will help educate individuals about how physical activity could positively impact their lives, specifically with regards to social physique anxiety.

Simultaneous Vibration Isolation and Energy Harvesting

Nolan Williamson, CURO Research Assistant
Dr. Benjamin Davis, College of Engineering

Vibration isolators are employed in a wide variety of everyday applications to minimize the force or motion transmitted to a device from a known source of vibration. Recently, researchers have studied vibration isolators that use buckled beams in place of traditional linear springs. A buckled beam exhibits nonlinear stiffness characteristics, a property which is valuable in vibration isolation as it allows for a wider range of isolation frequencies with less static displacement of the test mass. For this experiment, a prototype isolator was fabricated and tested to determine its performance characteristics. Then, piezoelectric patches were added to the buckled beams to allow useful electric power to be harvested from the otherwise wasted vibrational energy of the buckled beams. Performance with respect to vibration isolation and energy harvesting is investigated experimentally by measuring the power produced by the piezoelectric elements and the transmissibility between the applied vibration and the motion of the test mass. This device could be used in a number of applications, as it would allow for the protection of sensitive devices from harmful vibration, while also generating useful electric that can be used to power other equipment.

Characterization of the Inositol Hexakisphosphate Kinase (IP6K) of *Trypanosoma brucei*

Brian Windle
Ciro Cordeiro, Graduate Student
Dr. Roberto Docampo, Cellular Biology, Franklin College of Arts & Sciences

Trypanosoma brucei causes human African trypanosomiasis (HAT), one of the most neglected diseases in the world. The parasite alters its morphology between an insect and mammalian host and different functional stages. The adaptation to these diverse environments requires rapid changes and the involvement of signaling pathways. We are currently studying a signaling pathway that results in the synthesis of inositol pyrophosphates (InsPPs). InsPPs are present

in all eukaryotes studied and have a variety of functions. The first enzyme involved in their synthesis is the inositol hexakisphosphate kinase (IP6K) that converts inositol hexakisphosphate (IP_6) into diphosphoinositol pentakisphosphate (5PP-IP_5, or IP_7), which has a PP_i group at carbon 5. In this work the *T. brucei* IP_6K was cloned, sequenced, and expressed in *Escherichia coli*. For kinetic studies we measured ATP consumption using a Kinase-Glo Max luminescence kit. Furthermore, $TbIP_6K$ reaction products were identified by electrophoresis in 35% polyacrylamide gels. We determined that the optimal pH for protein function was between pH 6.5 and 7.0. We confirmed that $TbIP_6K$ transfers a phosphate from ATP to inositol hexakisphosphate (IP_6) to form IP_7 and ADP. $TbIP_6K$ also has a phosphatase activity, transferring a phosphate from IP_6 to ADP to form ATP and inositol IP_5. Characterizing this pathway not only will provide a better understanding of trypanosoma biology but of the biology of other eukaryotes.

Nutrient Relations of a Sexually Dimorphic Plant Species

Mavis Wolf, CURO Research Assistant
Dr. Shu-Mei Chang, Plant Biology, Franklin College of Arts & Sciences

Geranium maculatum is a perennial herbaceous understory plant that grows along the Eastern side of North America; ranging from Ontario, Canada to Alabama and west to Missouri. *G. maculatum* is a gynodioecious species with female plants coexisting with their hermaphroditic conspecific individuals in some populations. In these gynodioecious populations, the establishment of females in a population of hermaphrodites has been suggested to depend on the habitat and the phenotypic plasticity of sex allocation in the hermaphrodites. Though reports show that abiotic environmental conditions such as soil moisture and precipitation are critical for explaining the lability in hermaphrodite phenotype and success of female reproduction, the effect of environmental nutrient limitation on sex distribution of gynodioecious species remains unclear. In this experiment, we seek to experimentally determine the optimal nitrogen:phosphorus (N:P) ratio for *G. maculatum* by administering nutrient treatments of varying N:P ratios to individuals over a growing season of three months. We will measure vegetative growth rate, reproductive output, and tissue nutrient content during the growing season. Using these data, we will be able to generate the baseline information regarding plant's interaction with their local soil nutrient levels. By comparing such baseline data and those we obtained from natural populations, we aim to achieve the following goals: (1) to better understand how sex distribution of *G. maculatum* in the wild might be related to their abiotic environments in their natural habitat and (2) to identify how and whether levels of nitrogen and phosphorus are limiting to growth for this native plant.

Investigating Interest in Ingesting Insects

Audrey Wright, CURO Research Assistant, CURO Graduation Distinction
Dr. Marianne Shockley, Entomology, College of Agricultural & Environmental Sciences

With a human population projected to reach nearly 10 billion people by 2050, current food production will need to double in order to sustain our species. Because expansion of existing agricultural land is neither likely nor realistically feasible, current farming practices must be reevaluated. Increasing livestock production, though seemingly necessary to supply enough edible protein to the world's population, will also exponentially increase already-high greenhouse gas emissions and exacerbate climate change. A more sustainable solution exists. Since invertebrates make up a majority of the biomass on the Earth, insects—the largest subgroup of

invertebrates—provide the most encouraging and sustainable solution for providing protein to a growing population. While some cultures have been eating insects for ages, a popular taboo exists in the Westernized world that condemns this practice. This study examined the effects of education and exposure on the attitudes towards insects and willingness to consume them as food. We surveyed 50 college students before and after five weeks of entomology and entomophagy education and consistent contact with live insect specimens. Our study supports the notion that increased education and exposure not only increases positivity towards insects, but also the inclination to consume them as food.

The Severity of Cases Admitted into a Small Animal Hospital and the Phase of the Full Moon

Alyssa Wuellner
Dr. Erik Hofmeister, Small Animal Medicine & Surgery, College of Veterinary Medicine

A correlation between the moon phases and human/animal behavior has long been a belief among people. Previous studies have suggested an increase in the number of cases seen or admitted into small animal hospitals during a full moon. However, other studies have shown no significant effect of the full moon. All previous studies have looked only at numbers of cases, not severity of cases. The purpose of this study was to determine if the severity of the cases (as determined by the cost and duration of treatment) admitted into a small animal hospital is correlated with the phase of the full moon. The hypothesis was that there is no correlation between the full moon phase and the severity of cases admitted into a small animal hospital. All data were obtained from the University of Georgia Veterinary Hospital's Medical Records. Cases were admitted to the hospital between 2009 and 2014. A full moon was defined as the date of the occurrence of the actual full moon plus and minus one day. Variables collected included cost of treatment and duration of stay in the hospital. A total of 82,455 cases were analyzed with approximately 9,935 being on dates classified as full moons. Of the cases analyzed so far, the cost of treatment is 17.9% higher on dates of the full moon versus dates of non-full moons, and the duration of hospitalization is 19.7% higher on dates of the full moon versus dates of non-full moons.

Prevalence of Pain in Dogs with Cancer

Alyssa Wuellner, Kayla Hargrove
Dr. Erik Hofmeister, Small Animal Medicine & Surgery, College of Veterinary Medicine

Cancer is painful in people, but the effect of cancer on pain in dogs is unknown. Knowing the prevalence of pain in dogs with cancer could help us to prevent and treat the pain. The purpose of this study was to determine the prevalence of pain in dogs diagnosed with cancer. The hypothesis was that dogs with cancer will have a substantial prevalence of clinically significant pain. Dogs that have been diagnosed with cancer that have no interfering pre-existing medical conditions presenting to the University of Georgia's Veterinary Teaching Hospital were considered for inclusion. After client consent was obtained, data on age, breed, type of cancer the patient has, length of time since diagnosis, and treatments the patient is receiving were recorded. Clients were presented with a survey asking about behavioral traits and the client's impression of their pet's pain level. Pain scoring was done by one of two researchers using a ranking system of either none, mild, moderate, severe, very severe, or worst possible. The average pain level reported on the cases was a level of "none", with no instances of the pain being reported as "severe", "very severe", or "worst possible." Dogs with cancer seem to have a lower prevalence of clinically significant pain than people.

Effects of Bisphenol A on Macrophages when Controlled with Genistein

Shibo Xu
Dr. Tai Guo, Anatomy & Radiology, College of Veterinary Medicine

Bisphenol A (BPA) is a convenient and affordable compound that is used to make clear plastics and epoxy resins, and is therefore used in a mass array of products. However, there have been numerous reports citing its adverse endocrine-disrupting effects on the human body, most relating to immune dysregulation. The objective of this study was to determine the effects of BPA on macrophages, which play a critical role in various diseases including diabetes and autism, by studying its interaction with the isoflavone genistein (GEN), a phytoestrogen found at high levels in soy products that possess many beneficial properties. It is hypothesized that GEN can reduce the detrimental effects of BPA on macrophages. In this study, PMA (phorbol 12-myristate 13-acetate; 10 nM) differentiated U937 macrophages, a widely used cell line for primary human macrophages, were exposed to different concentrations of BPA (0, 0.1, 1, and 10 μM) ± GEN (0,1, and 10 μM) and incubated over a period of 24 and 96 hours. Proliferation was then determined using Alamar blue dye. BPA at 1 and 10 μM significantly suppressed the proliferation of macrophages following 96 hour of exposure, which could be attenuated by GEN at 1 and 10 μM with more effects observed at 10 μM. The proliferation of macrophages was not significantly affected by BPA at 24 h, while it was increased by GEN at 10 μM. Taken together, the results indicate that GEN can attenuate the inhibitory effect of BPA on macrophage proliferation in a long-term cell culture.

Influence of Genetic Background on Anthocyanin-Mediated Antioxidant Mechanisms

Sarah Yoo, CURO Research Assistant
Dr. Robert Pazdro, Foods & Nutrition, College of Family & Consumer Sciences

Glutathione (GSH) is an important cellular antioxidant that mitigates the harmful effects of oxidative stress in diseases such as diabetes. A recent 2014 study by Zhou, et al., identified novel candidate genes that regulate GSH, but the effects of diet on this process remain unclear. Anthocyanins, a class of pigments found in plant tissues, demonstrate many potential health benefits, including protection against oxidative stress. The anthocyanin cyanidin-3-0-beta-glucoside (C3G) stimulates synthesis of GSH, which ultimately reduces oxidative stress (Zhu et al., 2011). We predict that genetic background regulates GSH responses to C3G, and we also hypothesize that C3G-induced GSH synthesis is tissue-specific. To test our hypotheses, mice representing five genetically-diverse mouse strains (A/J, 129s1/SvlmJ, CAST/EiJ, C57BL/6J, and NOD/ShiLtJ) will be fed either a control or high-C3G (100 mg/kg C3G) diet. After six weeks, on their respective diets, mice will be euthanized and several tissues will be harvested, including liver, kidney, and heart; GSH will be quantified in these tissues. This study will serve as the foundation for future efforts to identify candidate genes that determine C3G-mediated antioxidant mechanisms.

The Effect of Anesthetic Variables on Patient Outcome

Courtni Young, CURO Honors Scholar
Dr. Erik Hofmeister, Small Animal Medicine & Surgery, College of Veterinary Medicine

Many patient variables may affect outcome during a medical procedure. Most of the variables examined in the past have been related to the patient's status before the procedure. Events which arise under anesthesia may have a predictive relationship with outcome. The purpose of this study was to compare the correlation between anesthetic

variables and outcome variables. The hypothesis was that the anesthetic variables would have a direct though not proportional correlation to the outcome variables. We defined anesthetic variables as the events that take place before and during anesthesia. Some variables collected included drugs administered, incidents of hypotension, body temperature nadir, and duration of anesthesia. The outcome variables included the time in hospital, the amount of time in the intensive care unit, and the overall financial cost of hospitalization. Data was collected through the records of current and previous patients admitted to the University of Georgia's Small Animal Teaching Hospital. Based on our results, among other things we have concluded that longer time under anesthesia tends to lead to greater chances of having either hypothermia or hyperthermia at some point during the operation, that breed has minimal influence over the amount of anesthesia needed, and that patients under anesthesia longer are more likely to need post operational oxygen after the operation.

Seeing Danger?: How Weapon Priming Changes Beliefs that the World is Threatening

Jacob Young
Dr. Michelle vanDellen, Psychology, Franklin College of Arts & Sciences

Previous research has investigated the effects of seeing weapons on aggressive behaviors but little research has investigated how weapons affect cognition. The purpose of this study was to determine if seeing handguns leads to an increase in how threatening people perceive the world to be. Participants in the study played a computer-based sorting game and were randomly assigned either to a game sorting pictures of handguns and tools or a game sorting pictures of sporting equipment and tools. The participants then reported how threatening they perceived the world to be. Additionally, they read several ambiguous social scenarios in which they rated how hostile a person's actions were and how hostile their response would be if they were in the scenario. Finally, participants completed a personality inventory and demographic information. Though we did not find that seeing handguns increased beliefs that the world is threatening overall, we did find an interaction between political beliefs and condition. Participants who were politically conservative viewed the world as less threatening when exposed to guns compared to when they were not exposed to guns. Participants who were politically liberal, however, viewed the world as being more threatening when they were exposed to guns than when they were not exposed to guns. The results suggest that liberals and conservatives may disagree about gun control in policy in part because they have different cognitive reactions to seeing guns.

Estuarine Flow Rates in Coastal Georgia

Kathryn Youngblood, CURO Research Assistant
Dr. Brock Woodson, College of Engineering

This research project involves identifying flow rates into and out of a small estuary on the Georgia Coast near the Skidaway Institute of Oceanography (SKIO) as part of a larger project to quantify nutrient fluxes and anthropogenic effects in the marshland. The student collaborated with her mentor to develop a sampling design and program the Acoustic Doppler current profiler (ADCP), and then traveled with her mentor to Skidaway to execute a field deployment of the instrument at the mouth of Grove's Creek with members of SKIO faculty. After retrieval of the instrument in two weeks, the student will work with her mentor and use MATLAB to analyze the data for currents and turbulence of the water. They will work with a larger group at SKIO and contribute their findings to nutrient and oxygen data from Coastal Georgia.

Abstracts

The Effects of Preferred Listening on Anxiety, Nausea, and Claustrophobia of Cancer Patients during Radiation Treatment

Pomi Yun, CURO Research Assistant
Dr. Roy Kennedy, Hugh Hodgson School of Music

Purpose: The purpose of this study was to investigate the effects of cancer patients listening to their preferred music on claustrophobia, anxiety, and nausea during radiation treatments. Patients with head and/or neck cancer may experience claustrophobia as a result of having to wear a mask during their radiation treatments. *Method:* This quasi-experimental study included an experimental group who were exposed to music and a control group who were not exposed to music. The two groups were followed from their first treatment to their last day of radiation therapy. Data was collected via paper and pencil questionnaires for the dependent variables: anxiety, claustrophobia, and nausea. Since the treatment room was very small, the patients' preferred music was played on an Ipod connected to speakers through the application, Pandora, by the radiation therapist during each patient's treatments. *Results:* The results indicate that more than half of patients who listened to music during their radiation treatments showed lower levels of anxiety and claustrophobia than the control group. The researchers recorded qualitative comments that the patients made before and after treatments, which provided additional information concerning their experience. *Conclusion:* The results of this study may be of use to music therapy professionals that work with cancer patients undergoing radiation. In addition, no music therapy studies were found that specifically investigate the effects of patient preferred listening on the claustrophobia of cancer patients.

Multiple Muscle Stimulation to Enhance Health

Zoe Yurchuck, CURO Research Assistant
Rebecca Baltenberger
Dr. Kevin McCully, Kinesiology, College of Education

Introduction: Cardiovascular disease is the leading cause of death for patients with spinal cord injury (SCI) and other neurological diseases such as multiple sclerosis which can be attributed to the lack of physical activity. Neuromuscular electrical stimulation (NMES) could provide a cost-effective method of reducing the health risks associated with SCI and MS as it has been shown to increase skeletal muscle mass and improve mitochondrial capacity in these populations. *Methods:* Eight healthy individuals aged 19-21 completed a single 30 minute session of NMES. Electrical stimulation was applied to eight lower extremity muscles at a constant intensity during the protocol. Additionally, two participants also completed a second session which applied electrical stimulation at incremental increases of intensity to the same muscle groups throughout the duration of the protocol. Oxygen consumption, metabolic equivalents, ventilation, respiratory exchange ratio, heart rate, RPE, and pain were obtained during the duration of both protocols. *Results:* Oxygen consumption (VO2) and ventilation increased an average of 33% ($P<0.001$) during the 30 minutes session of NMES. Heart rate increased an average of 13% ($P=0.006$) and was highly variable. RER was inconsistent among subjects ($P=0.43$). *Conclusion:* Although an increase in oxygen consumption was observed during each session, the magnitude of the metabolic response was not enough to provide physiological benefits that could increase health. Therefore, future studies could use a treatment consisting of progressive intensities or different electrode placement in order to achieve the desired benefits while maintaining an acceptable level of comfort.

Time to Extinction in Deteriorating Environments

Katherine Zarada, CURO Research Assistant, CURO Graduation Distinction
Dr. John Drake, Odum School of Ecology

Theoretical models have failed to examine the effects of environmental deterioration on the distribution and delay of extinction times for populations despite the fact that environmental deterioration is currently a major threat to population persistence. We used computer models and simulations in the program R to show that the effects of deterioration on population dynamics affect both the changes in distribution and the delay between deterministic and realized extinction. We created three models to represent a decrease in birth rate, an increase in death rate, and a change in both rates due to deterioration. Each model ran for 1000 simulations with starting parameters representing the life histories of two organisms and initial carrying capacities of either 500 or 2000. While the distribution changes between carrying capacities and organisms were not significant, the differences between the models indicate the possibility for a large variation in extinction predictions if the differing effects of deterioration on the birth and death rates are not taken into consideration. The discrepancy in distributional changes is enhanced through the delay in extinction time, which varied from 10 to 80 years depending on the model. These delay and distribution variations allow for inexactitudes to be present in time to extinction predictions. Knowledge of the effects of deterioration and the inclusion of delay can help prevent such inaccuracies in future predictions of time to extinction for populations.

Analysis of Cortex and Pith Size Contribution to Fruit Size in Different Apple Cultivars

Mark Zenoble, CURO Research Assistant
Dr. Anish Malladi, Horticulture, College of Agricultural & Environmental Sciences

Apple fruit consists of the economically important fleshy cortex and a generally inedible pith/core, which can constitute a significant volume of the fruit. The relationship between core and cortex size among different cultivars is unknown. This study's objective is to determine the variation in core to cortex size ratios across apple cultivars. This knowledge could be applied to develop cultivars with more edible flesh. Thirty cultivars were used in this study. Fruit weight, length and diameter were measured using approximately 16 fruit from each cultivar. Half of the fruit from each cultivar were sliced longitudinally and the rest vertically to obtain sections of the core and cortex areas. These sections were scanned using a high resolution flatbed scanner. ImageJ software was used to determine the core and cortex sizes across the cultivars. Although the exterior area of the fruit section could be readily measured from the images, inversing the image was required to better visualize the vascular tissues that form the core boundary. Precise measurement of the dimensions of each of the components within the fruit is currently being performed. It is expected that significant variation in the core to cortex size ratios will be observed across the 30 cultivars. This would suggest that the growth of the core and the cortex tissues of the fruit are independently regulated. Such information can be applied to increase the size of the cortex region of the fruit, resulting in more of the edible part of the fruit.

Index

Index

D

Index

Index

L

M

Index

N

O

Index

P

Q

R

S

Index

T

Index

Z

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CURO

2016 CURO SYMPOSIUM

PROGRAM & ABSTRACTS

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2016

CURO

Symposium

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203 Moore College
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Table of Contents

CURO

April 4, 2016

Dear Students, Faculty, and Guests,

Welcome to the 16th annual CURO Symposium, UGA's celebration of undergraduate research across the disciplines. Many individuals—administrators, faculty members, staff, graduate students, and, of course, undergraduate students—have collaborated to make the CURO Symposium the premier undergraduate academic event at UGA.

Each year, the Symposium has grown larger, and the 2016 Symposium is the largest to date with 408 undergraduate researchers communicating their substantial accomplishments to their peers, mentors, and the public at large.

From its inception, the CURO Symposium has showcased research and scholarship in all disciplines. The 2016 Symposium continues that commitment, featuring presenters pursuing 85 different majors from 14 schools and colleges who are conducting research with 248 faculty members from 69 departments. This two-day event displays UGA's broad and substantial support of research and the invaluable commitment of UGA's administration and faculty to providing exceptional learning opportunities for our undergraduates.

Thank you for your continued support of undergraduate research and CURO.

Sincerely,

Dr. David S. Williams, '79, '82
Associate Provost and Director

Dr. Martin P. Rogers, '01, '11
Associate Director

Acknowledgements

Special Assistance for 2016 CURO Symposium

Ms. Kate Belgum	Administrative Associate, External Affairs, Honors Program
Ms. Dorothé Otemann	Coordinator of External Affairs, Honors Program
Ms. Amanda Pruitt	Assistant to the Director, Honors Program
Ms. Karen Newcomb	IT Professional, Honors Program

Technology Equipment and Support for 2016 CURO Symposium

Center for Teaching & Learning
Franklin College of Arts & Sciences
Honors Program
Odum School of Ecology
Terry College of Business

Reviewers for 2016 CURO Research Mentoring and Best Paper Awards

Dr. Martin Rogers	Associate Director of CURO & Honors
Dr. David S. Williams	Associate Provost and Director of Honors and CURO

Oral and Poster Session Conveners for 2016 CURO Symposium

Ms. Rachel Burns	Institute of Higher Education
Mr. Benjamin Campbell	Presidential Graduate Fellow, Department of Mathematics and Science Education
Ms. Rebecca Carter	Academic Advisor, Honors Program
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Dr. Martin Rogers	Associate Director of CURO & Honors
Ms. Heather Smith	Academic Advisor, Honors Program
Ms. Petrina M. Watkins	Grady College of Journalism & Mass Communication

Schedule

Monday, April 4, 2016

Oral Session I **11:15 a.m.-12:05 p.m.**
Athena Breakout Rooms A, B, C, D, G

Oral Session II **12:20-1:10 p.m.**
Athena Breakout Rooms A, B, C, D, G, H

Oral Session III **1:25-2:15 p.m.**
Athena Breakout Rooms A, B, C, D, G, H

Oral Session IV **2:30-3:20 p.m.**
Athena Breakout Rooms A, B, C, D, G, H

Awards and Keynote Session **3:30-4:30 p.m.**
Athena Room E

Poster Session and Reception **4:30-6:30 p.m.**
Grand Hall South (downstairs – use escalator in lobby)

Tuesday, April 5, 2016

Oral Session V **9:30-10:45 a.m.**
Athena Breakout Rooms A, B, C, D

Oral Session VI **11:00 a.m.-12:15 p.m.**
Athena Breakout Rooms A, B, C, D

Oral Session VII **12:30-1:45 p.m.**
Athena Breakout Rooms A, B, C, D, G

Oral Session VIII **2:00-3:15 p.m.**
Athena Breakout Rooms A, B, C, D, G

Oral Session IX **3:30-4:45 p.m.**
Athena Breakout Rooms A, B, C, D, G

CURO Research Mentoring Awards

The Office of the Senior Vice President for Academic Affairs and Provost and the Honors Program established the CURO Research Mentoring Awards, formerly the EURM awards, in 2001.

These awards recognize outstanding faculty who consistently engage undergraduate researchers through CURO Programming (courses, the symposium, summer fellows, JURO, theses, et al.) and enhance the learning experience of undergraduate researchers at the University of Georgia. Award recipients have provided superior research opportunities and mentoring and have collaborated with undergraduate researchers on publications and presentations at professional conferences.

Before 2014, awards were designated as "Early Career" and "Master Level" and were granted to corresponding faculty ranks.

2016

Dr. Mable Fok, Assistant Professor, Division of Electrical and Electronics Engineering, College Of Engineering

Dr. Richard Lewis, R.D., FACSM, Department of Foods and Nutrition, UGA Foundation Professor in Family and Consumer Sciences

2015

Dr. Jeb Byers, Professor, Odum School of Ecology

Dr. Erik Hofmeister, DVM, DACVAA, DECVAA, MA (Anesthesia), Associate Professor of Anesthesiology, Chief of Small Animal Surgery and Anesthesia, College of Veterinary Medicine

2014

Dr. Carl Bergmann, Associate Vice President for Research-Facilities; Associate Director, Complex Carbohydrate Research Center; Executive Director, Animal Health Research Center; Senior Research Scientist

Dr. Andrew Owsiak, Department of International Affairs, School of Public & International Affairs

2013

Master Level Faculty Award

Dr. Jennifer McDowell, Department of Psychology, Franklin College of Arts & Sciences

Early Career Faculty Award

Dr. Katalin Medvedev, Department of Textiles, Merchandising & Interiors, College of Family & Consumer Sciences

2012

Master Level Faculty Award

Dr. Lawrence Shimkets, Department of Microbiology, Franklin College of Arts & Sciences

Early Career Faculty Award

Dr. Michael Yabsley, Warnell School of Forestry & Natural Resources

2011

Master Level Faculty Award
Dr. Eric Stabb, Department of Microbiology
Early Career Faculty Award
Dr. John Drake, Odum School of Ecology

Program Award
Savannah River Ecology Laboratory
Dr. Kenneth McLeod, Interim Director

2010

Early Career Faculty Award
Dr. John C. Maerz, Warnell School of Forestry & Natural Resources

2009

Early Career Faculty Award
Dr. Brian S. Cummings, Department of Pharmaceutical & Biomedical Sciences
Dr. Anna C. Karls, Department of Microbiology
Dr. Dawn T. Robinson, Department of Sociology

2008

Master Level Faculty Award
Dr. John J. Maurer, College of Veterinary Medicine

Early Career Faculty Award
Dr. Walter K. Schmidt, Department of Biochemistry & Molecular Biology

Program Award
Biomedical and Health Sciences Institute
Dr. Harry S. Dailey, Director

2007

Master Level Faculty Award
Dr. Timothy Hoover, Department of Microbiology
Early Career Faculty Award
Dr. Steven Stice, Department of Animal & Dairy Science

2006

Master Level Faculty Award
Dr. Patricia Hunt-Hurst, Department of Textiles, Merchandising & Interiors
Early Career Faculty Award
Dr. Rodney Mauricio, Department of Genetics
Graduate Student Award
Christopher Anderson, PhD candidate in Ecology
Graduate Student Recognition
Dawn Holligan, PhD candidate in Plant Biology

CURO Research Mentoring Awards

2005

Faculty Award

Dr. Gary Barrett, Odum School of Ecology
Dr. Sidney Kushner, Department of Genetics

Department Award

Department of Cellular Biology

2004

Faculty Award

Dr. William S. Kisaalita, Department of Biological & Agricultural Engineering

2003

Faculty Award

Dr. Jody Clay-Warner, Department of Sociology

Department Award

Department of Microbiology
Dr. Duncan Krause, Department Head
Dr. Timothy Hoover, Undergraduate Coordinator

Program Award

The Pratt Laboratory of Plant Genomics and Bioinformatics
Dr. Lee H. Pratt, Department of Plant Biology
Dr. Marie-Michèle Cordonnier-Pratt, Department of Plant Biology

2002

Faculty Award

Professor William D. Paul, Jr., Lamar Dodd School of Art
Dr. Katherine Kipp, Department of Psychology

Faculty Recognition

Dr. Susan Sanchez, College of Veterinary Medicine

Department Award

Department of Biochemistry & Molecular Biology
Dr. J. David Puett, Department Head

Program Award

"Physics Beyond the Boundaries": National Science Foundation, REU Program
Dr. Loris Magnani, Principal Investigator, Department of Physics & Astronomy
Dr. Heinz-Bernd Schuttler, Department Head, Department of Physics & Astronomy
Dr. Jonathan Arnold, Department of Genetics
Dr. Susmita Datta, Georgia State University
Dr. David Logan, Clark Atlanta University
Dr. William Steffans, Clark Atlanta University

2001

Faculty Award

Dr. Marcus Fechheimer, Department of Cellular Biology

Faculty Recognition

Dr. David MacIntosh, Department of Environmental Health Sciences

Dr. Dean Rojek, Department of Sociology

Department Award

Department of Genetics
Dr. John MacDonald, Department Head

Program Award

Savannah River Ecology Laboratory
Dr. Paul Bertsch, Director

CURO Symposium Best Paper Awards

Since 2001, CURO Symposium Best Paper Awards have recognized excellence in papers developed from work being presented at that year's Symposium.

Each recipient is recognized at the Symposium's Award and Keynote Session, and each award carries $100 in financial support, generously provided by the UGA Alumni Association. Winners from the 2016 CURO Symposium are listed below.

Arts, Humanities, and Media:

Katherine Opacity	Tolstoy's Second Epilogue: On Page and Screen

Life Sciences:

Michelle Sequeira	Susceptibility to Chronic Social Defeat Stress Increases Ethanol Consumption in Mice

Physical and Environmental Sciences:

Dessa Dun	Ecosystem Services and Restoration Efforts of Campus Forests: Tanyard Creek and Driftmier Woods

Public and International Affairs:

Emily Maloney	Reducing Teacher Turnover in Georgia Public Schools

Social Sciences:

Megan Murphy	White Matter Structure Differs Between Schizophrenia and Healthy Comparison Groups as a Function of Cognitive Control and Age

Business:

John-Jordan Nunnery	How the Market Responds to Changes in Firm Health Policy

Program: Monday, April 4, 2016

Oral Session I: 11:15 a.m.-12:05 p.m.
Athena Breakout Rooms A, B, C, D, G

Room A	**Urmi Patel**	The Role of Dual Oxidase 1 in Tracheal Immunological Functions
	Madison Miracle	Investigating miRNA-195-Mediated Regulation of Cell Cycle Gene CHEK1 in Respiratory Syncytial Virus (RSV) Replication
	Chip Chambers	The Role of Cas4-2 in the CRISPR Adaptation Stage of *Pyroccocus furiosus*
Room B	**Joshua Willis**	Comparison of Oconee and Ocmulgee River Basins for Water Management Improvement
	Grace Power	Approaches to Reducing the Cost of Algal Biomass Production
	Lucas Montouchet	The Spatial Interaction between Cordgrass and Oysters across an Estuarine Gradient
Room C	**Emily Ivey, Olivia Carlson, Colleen Keeler**	The Influence of Psychosocial Functioning on Tic Severity in Children with Tourette Syndrome
	Kodiak Sauer	Cognitive Control as Assessed by Multiple Eye Tracking Paradigms
	Megan Murphy	White Matter Structure Differs between Schizophrenia and Healthy Comparison Groups as a Function of Cognitive Control and Age
Room D	**Catherine Braun**	The Hijab as a Feminist Tool of Agency
	Molly Mastin	Cooling Fabric: The Future of Keeping Cool
	Melissa Cousins	Optimizing Plique-à-Jour Enameling
Room G	**Ali Anderson**	Hookworm Egg Production in a Virulent Hookworm-Fur Seal System
	Caitlin Harris	*In-Vitro* and *In-Vivo* Assessment of a Yeast By-Product on the Inhibition of *Histomonas meleagridis*
	Mary Mehegan	Longitudinal Assessment of a Porcine Traumatic Brain Injury Model Utilizing Immunohistochemistry

Program: Monday, April 4, 2016

Oral Session II: 12:20-1:10 p.m.
Athena Breakout Rooms A, B, C, D, G, H

Room A	**Meili Swanson**	Issue Framing and Beliefs about the Importance of Climate Change Policy
	Ashka Patel	The Implications of International Intellectual Property Law on Global Access to Medicines
	Samuel Dickinson	The Influence of Social Conversation Case Study: Iran Nuclear Deal
Room B	**Mallika Madhusudan**	Eradicating Food Insecurity in Metro Atlanta
	Laura Pontari	Standardized Public Education Funding Formulas: A Best-Practice Evaluation
	Emily Maloney	Reducing Teacher Turnover in Georgia Public Schools
Room C	**Nivita Sharma**	Variation of Nanoparticle Surface Lipophilicity for Blood Brain Barrier Penetration
	Kodiak Sauer, Jacob Beckham	The Relationship between Central Nervous System Xanthophyll Status and Brain Activation in Healthy Older Adults
	Evan Knox	Effects of Cognitive Reserve and MPOD Levels on Personality in Older Adults
Room D	**Manisha Banga**	The Narrative Retelling of Marginalized Ancient Greek Mythological Characters by Contemporary Female Authors
	Sydney Wilson	Copy-Cats: Aphra Behn's *The History of the Nun* and Its Adaptations
	Joy Peltier	Functions of the Discourse Marker *"Bon"* in Spoken French
Room G	**Nikita Vantsev**	The Role of Cas1, Cas2, Csn2, and Cas9 in the Type II CRISPR-Cas Adaptation
	Bryan Grommersch	Metallothermic Reductions and Conductive Coatings for Lithium-Ion Battery Anode Materials
	Melissa Jennings	Regulation of Base J Synthesis in Trypanosomes
Room H	**David Reagan**	A Bright and Budding Future for Sunflowers: Understanding the Predictive Properties of *Helianthus annuus* Seedlings for Improving Adult-Stage Crop Yield

	Hayley Schroeder	The Effects of Migration and Infection on Resting and Flight Metabolism in Monarchs
	Jessica Story	Detritus Preferences in a Mangrove-Saltmarsh Ecotone

Oral Session III: 1:25-2:15 p.m.
Athena Breakout Rooms A, B, C, D, G, H

Room A	**Rebekah Worick**	Soldiers of Fortune: The Incidence of Mercenary Usage in Civil Conflict
	Sarah Sammons	How the Recruitment of Female Fighters for Islam Has Changed Transnational Terrorist Organizations and What the Long-Term Implications of This Trend Will Be for Interstate Conflicts
	Kimberlee John-Williams	The Effect of the Colonial Past on Women's Representation in the Caribbean
Room B	**Emily Maloney**	Correspondence between Family Needs and Family Goals: Implications for Early Childhood Interventions for Low-Income Families
	Hailey Clark	Addressing Teenage Pregnancy in Athens-Clarke County, Georgia
	Jenny Alpaugh	Examining Diversity in High School Publication Staffs
Room C	**Caroline Shearer**	Parasite Infection and Host Behavioral Complexity
	Martinique Edwards	Abundance of *Vibrio* Bacteria Associated with White Pox Disease in Elkhorn Corals
	Isabel Ott	Investigating a Potentially Novel Cache Valley Virus Variant in a Clinical Case in Missouri
Room D	**Insiyaa Ahmed**	Trait Variation in Sunflower Cultivars Grown Under Nutrient Stress Conditions
	Thomas Gottilla	Evolutionary Analysis of Mating-Type Genes in *Stagonosporopsis* Species Causing Gummy Stem Blight of Cucurbits
	Sabrina Park	Genetic Analysis of *Exobasidium maculosum* Using Microsatellites
Room G	**Patric Campbell**	Geographic Distribution of Adult Body Mass in Muridae

	Elizabeth Wilkes, Julia Connell	Fracking Governance and Resistance in Western North Carolina
	Shannon Burns	Spatial and Temporal Iron Isotope Fractionation in Hawaiian Soils
Room H	**Garrison West, Markus Cleveland, Alan Bosworth, Alexandria Lushaj**	Forensically Influential Beetle Fauna in the Spring
	John Roquet	Predictable Variation in Temporal Transmission Potential: West Nile Virus as a Case Study
	Onyinyechi Ochiobi	Investigations of How *Lysinibacillus sphaericus* Bin Toxin Kills a Cell Line Derived from the Malarial Mosquito *Anopheles gambiae*

Oral Session IV: 2:30-3:20 p.m.
Athena Breakout Rooms A, B, C, D, G, H

Room A	**Joshua Reynolds**	Lutein and Zeaxanthin Are Unrelated to Performance on the Short Physical Performance Battery
	Morgan Gibbs	Methadone and Loperamide Interactions with the Multidrug Transporter P-Glycoprotein
	Caroline Langley	Examining the Antioxidant Properties of Hops
Room B	**Allison Fialkowski**	Best Practice for Informing Parents of their Newborn's Disability
	Vineet Raman	Eliminating Cultural and Linguistic Boundaries in Healthcare: Creating Standards and Funding for Medical Interpreters
	Sara Johnson	Parentification as a Predictor of Emotion Dysregulation in Young Adults
Room C	**Catriona Geddes**	Personality Judgment Accuracy: Personality and Social Context Influence the Way People See Each Other
	Benjamin Shepard	IO Variables in Gaming: When Work is Play
	Lauren Locklear, Ian Armstrong	Third Party Reactions to Mistreatment: A Meta-Analysis

Program: Monday, April 4, 2016

Room D	**Marrissa Blackwell**	The Effect of Form and Source on Bioavailability of Vitamin E Supplementation in Mature Horses
	Adrea Mueller	Expression Analysis of Immune Genes in the Liver and Ceca of Blackhead Infected Turkeys
	Kathryn Sellman	Use of Social Recognition Test and Open Field Test to Assess Piglet Cognition
Room G	**Chelsea Thorpe**	Has *Laïcité* Transformed into a Law of Islamophobia?
	Taylor Martin, Rachael Andrews	A Policy Proposal for the Reduction of Violence in Georgia's State Prisons
	Hanna Han	Examination of Supply-Side Incentives and Motivations That Perpetuate the Skill Mismatch of Cambodian University Graduates
Room H	**Shannon Hochschild**	Dressing with a Disability
	Grace Donnelly	Seeing the Future: Interactive Data Visualization and Behavioral Intentions
	John-Jordan Nunnery	How the Market Responds to Changes in Firm Health Policy

Awards and Keynote Session: 3:30-4:30 p.m.
Athena Room E

Welcome and Introductions	David S. Williams, Associate Provost and Director of Honors and CURO
Remarks	Jere W. Morehead, President
	Pamela Whitten, Senior Vice President for Academic Affairs and Provost
Introduction to Awards	Martin Rogers, Associate Director of CURO and Honors
CURO Research Mentoring Awards	David C. Lee, Vice President for Research
2016 Symposium Best Paper Awards	Rahul Shrivastav, Vice President for Instruction
	Meredith Johnson, Executive Director of Alumni Association
UGA Libraries' Research Awards	Caroline Barratt, UGA Libraries

Program: Monday, April 4, 2016

Introduction of Keynote Speaker	Ms. Nivita Sharma, Class of 2018, Biochemistry & Molecular Biology
Keynote Address	Dr. Alan Darvill, Director of the Complex Carbohydrate Research Center (CCRC) and Regents Professor of Biochemistry & Molecular Biology, "Lessons Learned Studying Carbohydrates"
Closing Comments	David S. Williams

Poster Session and Reception: 4:30-6:30 p.m.
Sponsored by the Office of the President
Grand Hall South

Poster # 1	**Emily Tyus**	The Use of Entertainment Education to Teach Nutrition Messages to Preschool Children: A Feasibility Study
Poster # 2	**Brittany Whitlock**	Implications of Inherited Microbial Profile in Long-Term Metabolic Health
Poster # 3	**Jenissa Gordon**	Neutrophil and Granulocyte Methylation in Normal Weight and Obese Individuals
Poster # 4	**Joann Yang**	Blood Folate and Whole Blood Global DNA Methylation Response to Folic Acid Supplementation Dose during Pregnancy
Poster # 5	**Fatima Kamal**	The Effects of Two Different High-Fat Diets on Appetite
Poster # 6	**Annie Ladisic**	Effect of Strategic Marketing on Healthier Vending Machine Sales
Poster # 7	**Kayla Patel**	Maternal Obesity and Trabecular Bone Microarchitecture in C57BL Mice
Poster # 8	**Emily Rollins**	Muscle Adiposity, Forearm Muscle Strength, and Radius Cortical Bone Geometry in Children
Poster # 9	**Erica Coe**	Natural Killer Cell Maturation is Controlled by Genetic Background in Aging Mice
Poster # 10	**Zixuan Jiang**	Circulating Concentrations of Growth Differentiation Factor 11 Are Heritable and Correlate with Life Span
Poster # 11	**Stephanie King**	Diet-Induced Obesity Differentially Regulates Glutathione Homeostasis in C57BL/6J, BALB/cByJ, and AKR/J Mice

Poster # 12	**Claire Yakaitis**	Heritability of Tissue Glutathione Levels and Redox Status in Aged Mice
Poster # 13	**Courtney Meyer**	A First Description of Nest Behavior in Red-and-Green Macaws
Poster # 14	**Rhianna Baldree, Emily Unholz, Margaret Bergmann**	Practice Makes Perfect: A Capuchin Monkey Becomes Skillful at Nut Cracking with an Unfamiliar Stone
Poster # 15	**Rachel Pack**	Wild Bearded Capuchins (*Sapajus libidinosus*) Use Tools in Fazenda Boa Vista, Brazil: Positioning the Nut Predicts Success
Poster # 16	**Lindsey Roles**	Who Is Better at Cracking Nuts: Humans or Monkeys?
Poster # 17	**Spencer Sheheane**	Using an Unconventional Tool: A Capuchin Monkey Becomes Skillful
Poster # 18	**Harrison Cloud**	The Effects of Lutein and Zeaxanthin Supplementation on Sensory Function in Healthy Adults
Poster # 19	**David Cromer, Eli Chlan**	The Effects of Serum Dietary Carotenoid Levels on Cognitive Function in Healthy Adults
Poster # 20	**Katelynn Porto**	Developmental Trends in Infant Temporal Processing Speed
Poster # 21	**Nicole Negri**	Cognitive-Behavioral Therapy for Adults with ADHD: A Meta-Analysis
Poster # 22	**Abigail Mistretta**	Differences in Brain Morphometry as a Predictor of Smoking Cessation Treatment Success in Nicotine-Dependent Smokers
Poster # 23	**Marie Rapoport**	Behavioral Economic Analysis of Relative Reinforcing Value as a Predictor of Smoking Cessation Treatment Outcomes
Poster # 24	**Ketki Desai, Luvika Gupta**	Influence of Intelligence on Correlation between Personality and Recreational Marijuana Use
Poster # 25	**Lauren Locklear**	The Effect of Gender Identification and Division of Labor on the Work and Family Experiences of Same Sex Couples
Poster # 26	**Selin Odman, Lindsey Murry**	The Effect of Corporate Wellness Program Benefits Over Time on End-Of-Workday Strain

Poster # 27	**Jacob Pendergraft, Parker Nayman, Fatima Koko, Christiana Agbonghae, Nikita Meka**	Words That Lead and Words That Follow: Lexical Indicators of Leadership
Poster # 28	**Benjamin Shepard, Julia Willis, Alex Moore, Holly Wright, Nick Sciales**	Personality Predictors of Team Work Relationships: Characteristics that Make Friends
Poster # 29	**Taylor Gutwillig**	Lunchroom Table Talkers Talk Students into Eating Fruits and Vegetables
Poster # 30	**Molly Minnen**	Friends and Coworkers
Poster # 31	**Jacob Young**	Cognition in the Crosshairs
Poster # 32	**Olivia Carlson, Emily Ivey, Colleen Keeler**	Pre-to-Post Transplantation Changes in Caregiver Emotional Functioning
Poster # 33	**Avery Campbell**	The Influence of Formal and Informal Sources of Support on Foster Parents' Couple and Co-parenting Relationship Quality
Poster # 34	**Megha Kalia**	Evidence-Based Interventions to Increase Wait Time and Decrease Problem Behaviors in Children with Autism
Poster # 35	**MacKenzie McGraw, Breanna Johnson, Sherry Sayavongsa, Alexis Pope, Meredith Towey, Hayley O'Hara, Sabrina Williams, Courtney Todd, Brianna Kelley, Anna Fink, Chase Kranzlein**	An Exploration of Communicative Intent and Its Relation to Early Vocalization Production in Two Young Children with Autism Spectrum Disorder
Poster # 36	**Breana Johnson, Alexis Pope, Mackenzie McGraw, Sherry Sayavongsa, Meredith Towey,**	The Role of Auditory Skill Development in the Advancement of Vocalization Development

	Hayley O'Hara, Courtney Todd, Anna Fink, Sabrina Williams, Chase Kranzlein, Brianna Kelley	
Poster # 37	**Margaret Naughton**	Examining the Relation between Stigma and Self-Esteem, Self-Efficacy, and Social Satisfaction in Young Adults with Autism Spectrum Disorder
Poster # 38	**Maria Ceron**	University Professors with Disabilities
Poster # 39	**Elliott Beale**	The Effect of Social Comparison on College Students' Attitudes toward Debt and Their Ability to Delay Gratification
Poster # 40	**Connor Gibbs**	A Faulty System: An Empirical Analysis on Student Loan Default
Poster # 41	**Theodore Gorman**	Credit Usage and Financial Literacy among University Students
Poster # 42	**Madison Nichols**	The True Cost of Medical Credit Cards on Patient Credit Scores
Poster # 43	**Benjamin Jacobs, Robin Haas**	Financial Literacy, Risk Tolerance, and Goals-Based Savings Behavior
Poster # 44	**Katie Cannon**	Corporate Social Responsibility and Stock Prices: The Environmental Responsibility of Shareholders
Poster # 45	**Mary Chastain**	Corporate Environmental Responsibility Recognition and Firm Value
Poster # 46	**Haris Vukotic**	Impact of Investment Bank Advisers on Merger Premiums and Merger Closing Times
Poster # 47	**Sona Rao**	A Review of the Use of Telemedicine in Nursing Homes
Poster # 48	**Thomas McBrearty**	Earning Disparity Among White and Black Women in South Africa
Poster # 49	**Michael Hutchison**	Legal Context to Violating Women
Poster # 50	**Rory Hibbler**	Ballot Initiatives and Voter Turnout
Poster # 51	**Shaunteri Skinner**	The Political Evolution of Malcolm X

Poster # 52	**Taylor Hill**	The *speAk* Movement: Social Media for Global Issues
Poster # 53	**Katherine McKeogh**	Understanding the Public's Relationships with ISIS and Counter-Terrorism Digital Media
Poster # 54	**Kari Saunders**	Off-Campus Housing and the Gentrification of Downtown Athens, GA
Poster # 55	**Emily Taylor**	UGA Campus Sustainability Initiatives: Awareness and Attitudes to Campus Recycling
Poster # 56	**Kendall Trammell**	Impact of Video Captions in Mobile News
Poster # 57	**Kalyn Wilson**	Learning Beyond the Lines
Poster # 58	**Andrew Kane**	Finding Optimal Designs Using Genetic Algorithms
Poster # 59	**Zack Stokes**	In Search of Optimal Designs Using Differential Evolution Algorithm
Poster # 60	**Steve Dixon**	Creating a Pseudo-Random Number Generator Using the Spectral Analysis Test and Genetic Algorithms
Poster # 61	**Justin Payan**	Keyword Extraction Using Artificial Neural Networks and a TextRank Variant
Poster # 62	**Sidney Reynolds**	Subtracting the Effects of Carbonization of Hickory Nut to Predict Mean Annual Precipitation in Archaeological Sites
Poster # 63	**Catherine Bernard**	Thinking Geographically in Regards to Power Dynamics of the Social Environment: Its Effect on Health
Poster # 64	**Joe Booth**	Mineralogy and Petrology of Huerfano Butte: A Tertiary Intrusion on the Great Plains, Colorado
Poster # 65	**Rachel Ehlinger**	Comparative Analysis of Soil Organic Matter Fractionation in Ultisols
Poster # 66	**Sarah Hickey**	Drift Between Two Specific Conductivity Probes
Poster # 67	**Morrison Nolan**	Re-evaluating Proposed Identities of *Brooksella alternata* of the Conasauga Shale of Georgia and Alabama
Poster # 68	**Chance Pittman**	3D Distribution of High Galactic Latitude Interstellar Clouds
Poster # 69	**John Dupuy**	What is a Sticking Event in Classical Molecular

		Dynamics? A Study of Hydrogen Sticking to Amorphous Water-Ice
Poster # 70	**Ansley Miller**	Computational Modeling of Laboratory X-Ray Emission Due to Low-Energy Collisions of H-like and He-like Ions with H2
Poster # 71	**Patrick Mullen**	Charge Exchange: Atomic Data of Astronomical Significance
Poster # 72	**Ryan Pattillo**	Photodissociation of CS from Excited Rovibrational Levels in Interstellar Environments
Poster # 73	**Clark Veazey**	Computational Investigations of H2-HD Collisions in the Interstellar Medium
Poster # 74	**Daniel Carlson**	Investigating the Plasmonic Property of Ag-Cu Alloy Nanostructures
Poster # 75	**Adam Howington**	Microplastic Sampling in the Atlantic Ocean
Poster # 76	**Christopher Lenear**	Analysis of Surfactant Patterns Induced by Carbon Nanotube Arrays
Poster # 77	**Sarah Chaji**	Novel Nitric Oxide Releasing Materials for Prevention of Infection in Vascular Catheters
Poster # 78	**Alyssa Ghuman**	Passive Drug Delivery for Intraocular Applications
Poster # 79	**Sommer Anjum**	Lung Abnormality Detection from Laser Projection Modeling
Poster # 80	**So Hyun Lim**	Lung Cancer Cell Enrichment with Buffer Stream via Biocompatible Ferrofluid and Microfluidic Device
Poster # 81	**Ben Burgh**	Diabetes Self-Education App
Poster # 82	**Tyler Fischer**	Characterization of a Muconic Acid Biosensor-Reporter System in *E. coli*
Poster # 83	**Andrew Lyon**	Fluorescent Protein Incorporation in *E. coli* for Determination of Gene Expression Levels
Poster # 84	**Aaron Patrick**	Integration of Multispectral Imaging into UAS
Poster # 85	**Elena Morais**	Georgia SOL (Solar Optimization by Location)
Poster # 86	**Rashaan Fowles**	Design of Mass Concrete Specimens and Test Procedures

Poster # 87	**Maximillian Ovett**	To Close or Not to Close for Severe Winds: Two Cable-Stayed Bridges in the Georgia Coast Region
Poster # 88	**Nicholas Rorabaugh**	Evaluation of Georgia Bridges and Development of Large-Scale Bridge Testing Procedure
Poster # 89	**Sokngim Kim**	A Computer Program for Planar Truss Analysis
Poster # 90	**Katelyn Stallings**	Recycled Tire Chips for Use in Concrete Barrier Walls and Other Applications
Poster # 91	**Matthew Sullivan**	Beneficial Use of Metakaolin for Georgia Concrete Pavements
Poster # 92	**Carter Fitzgerald**	Optimization of Biogas to Electricity Plant
Poster # 93	**Julian Gendreau**	Functions of HAN in *Arabidopsis* Embryo Development
Poster # 94	**Ellen Krall**	Response of *Helianthus annuus* Biomass to Nutrient Stress
Poster # 95	**Morgan Najdowski**	The Determination of Sunflower Growth in Different Genetic Lines and under Various Nutrient Conditions
Poster # 96	**Kiara Shelby**	The Influence of Nutrient Stress on Mass Performance Rankings among Cultivated Sunflowers
Poster # 97	**Nicole de Leon Torralba**	Investigating the Phenotypic and Genetic Mechanisms of Root Architecture Traits in Cultivated Sunflower Seedlings under Drought Stress
Poster # 98	**Mary Lewis**	Far Red LEDs Effect on the Morphology and Flowering of Marigolds
Poster # 99	**Nicole Encardes**	Evaluation of Yield and Essential Oil Content of Holy Basil Varieties
Poster # 100	**Lindsey White**	Social Perceptions of the Impacts and Benefits of Non-Native Species in the Garden: The Case of Chinese Privet in the Southeastern U.S.
Poster # 101	**Elizabeth Hardister**	Hurricane Forecasting and Healthcare Facility Evacuations
Poster # 102	**Kaley Desher**	Addressing Severe Mental Illness of Atlanta's Chronically Homeless
Poster # 103	**Jamarcus Mathis**	Male Participation in Chronic Disease Self-Management Education (CDSME) Programs

Poster # 104	**Mehabuba Rahman**	Mental and Sexual Health Post-War: Trauma, Depression, and Interpersonal Violence— Attitudes among Liberian Women
Poster # 105	**Ashley Bradford**	Marijuana Use, Nutritional Behaviors, and Educational Attainment in U.S. School-Aged Youth
Poster # 106	**Taylor Chishom**	Analysis of the Relationship between Patient Satisfaction Scores and Patient Health Outcomes
Poster # 107	**Morgan Green**	Effect of Multiple Ankle Sprains on Functional Performance Tests in Adolescents
Poster # 108	**Alyssa Varsalona**	Prevalence of Current Season Injuries in Collegiate Club Rugby Players with a Previous Injury History
Poster # 109	**Anita Qualls**	The Role of Mitochondrial Maintenance in Skeletal Muscle Strength and Repair
Poster # 110	**Rebecca Baltenberger**	Quantifying Muscle Function in a Previously Fatigued Muscle
Poster # 111	**Shaun Goh**	Measuring Muscle Fatigue in Men vs. Women Using Mechanomyography
Poster # 112	**Kajal Mistry**	Assessing Trapezius Endurance using Electrical Twitch Stimulation after Exercise
Poster # 113	**Sahil Patel**	Evaluation of Electric Twitch Endurance Index of the Lower Back Muscles
Poster # 114	**Payton Prins**	Evaluation of Recovery of Skeletal Muscle after Fatiguing Contractions
Poster # 115	**Joanna Szymonik, Kelly-Ann Peters**	The Effects of Iron Deficiency Anemia on Mitochondrial Capacity
Poster # 116	**Nathan Schlies**	The Effects of Lifetime Sports Participation and Sedentary Time on Muscle Capacity: Does More Activity Offset The Effects of Prolonged Sitting?
Poster # 117	**Sydney Alyce Bourget**	Assessing the Costs of Investments in Immunocompetence on the Fitness of *Hemigrapsus sanguineus*
Poster # 118	**Hayley Schroeder**	Comparing Immune Defenses and Pathogen Susceptibility in Closely Related Host Species

Poster # 119	**Sarah Clement**	Effects of Fire in a Riparian Zone on Aquatic Fungi
Poster # 120	**Rachel Usher**	Feeding the Urban Stream: How Nutrients and Microbes Impact Stream Carbon Reserves
Poster # 121	**Adrianne Smith**	Diazinon Promotes Adipogenesis in 3T3-L1 Preadipocytes
Poster # 122	**Jackson Rodgers**	Quantification of Contaminants of Emerging Concern in Fish and Shark Tissue from Sapelo Island, Georgia
Poster # 123	**Angela Lucero**	Modeling and Analysis of Virus-Bacteria Interactions in the Marine Environment
Poster # 124	**Guy Eroh**	Analysis of Hybridization in Chattahoochee Bass (*Micropterus chattahoochae*) Populations below Lake Lanier
Poster # 125	**Meghan Tait**	Influences of Predators on Parasite Prevalence in *Crassostrea virginica*
Poster # 126	**Usha Kaila**	How do Middle School Students Define Sustainability? A Preliminary Analysis of Focus Groups
Poster # 127	**Andrew Disharoon**	Engineering Soybean Mosaic Virus Resistance Utilizing tasiRNA
Poster # 128	**Tate Hutwagner**	Applying Computer Vision Analysis to Plant Phenotyping
Poster # 129	**Darcie Bruce**	Characterization of *Bacillus thuringiensis* Cry51Aa Toxicity to *Lygus*
Poster # 130	**Gillian Caudill**	Possibility of Attitude Change towards Edible Insects When Prepared by Top Chefs
Poster # 131	**Elijah Mehlferber**	Determining the Effect of Gut Microbes on *Drosophila suzukii* Gene Expression
Poster # 132	**Nicole Bisel**	The Role of Chondroitin Sulfate Glycosaminoglycans in Glioma Cell Progression
Poster # 133	**Tarun Daniel**	Neural Network Formation and Response to Pharmacological Stimulation
Poster # 134	**Caroline Coleman**	Use of a Spatial T-Maze Test and an Object Recognition Test to Assess Learning and Memory in a Piglet Model
Poster # 135	**Meagan Thomason**	Reactive Microglia as a Biomarker in a Piglet Model of

		Traumatic Brain Injury
Poster # 136	**Madelaine Wendzik**	Pathological Assessment of a Piglet Model of Traumatic Brain Injury Utilizing Non-Invasive Magnetic Resonance Imaging
Poster # 137	**Arjun Patel**	Cytotoxicity of Gold Nanoparticles with Feline Injection Site Sarcoma, *In Vitro*
Poster # 138	**Erika Evanoff**	MGMT Expression in Canine Glial Tumors
Poster # 139	**Susan Jones**	Quantitative PCR Detection of the SRY Gene of Male Dog Mesenchymal Stem Cells in Female Dog Brains with Experimentally Induced Ischemic Stroke
Poster # 140	**Kaitlyn Ruff**	Analysis of Forces Acting on the Equine Navicular Bone in Normal and Dorsiflexed Positions
Poster # 141	**Wendi Bao**	Comparing Meiotic Spindle Structure and Chromosome Attachment in Control and Pericentrin-Depleted Mouse Oocytes
Poster # 142	**Madison Canning**	Synthetic Estrogen Disrupts Spindle Organization and Meiotic Division in Oocytes
Poster # 143	**Annika Carter**	Effects of Maternal Immune Stimulation by a Viral Mimic on Autistic and Other Behaviors of Juvenile and Adult Mouse Offspring
Poster # 144	**Scott Chimberoff**	Yohimbine-Induced Reinstatement in Alcohol-Preferring and Wistar Rats
Poster # 145	**Michelle Sequeira**	Susceptibility to Chronic Social Defeat Stress Increases Ethanol Consumption in Mice
Poster # 146	**Brent Gawey**	Diet-Induced Obesity is Associated with a Change in Intestinal Innervation and Disruption of Gut-Brain Communication
Poster # 147	**Daye Park**	Effect of Different Concentrations of 25-Hydroxycholestrol on Osteogenic Differentiation of Mesenchymal Stem Cells (MSC) from Broiler Compact Bone
Poster # 148	**Camille Bauer**	Development of Immunologic Reagents for the Ferret Animal Model
Poster # 149	**Preston Samowitz**	Evaluation of Novel Antiviral Drug NS95397 for

		Treatment of Swine Influenza Infections in Pig Cells
Poster # 150	**Nicole Gilreath**	Serum Levels of Circulating and Exosomal MicroRNA Regulate Transformed Cell Growth
Poster # 151	**Christian Cullen**	The Role of Flagellar Motility in *Pseudomonas aeruginosa*-induced NET Formation
Poster # 152	**Nirali Patel**	Investigating the Antiparasitic Activity of Cry5B Protein against Fourth-Stage Nematode Parasites
Poster # 153	**Sahl Hakim**	Examining a Potential Role for *Mycobacterium tuberculosis* CtpB in Copper Transport
Poster # 154	**Ashitha Rajeurs**	Examining *Mycobacterium tuberculosis* Genes for Roles in B12 Synthesis
Poster # 155	**Kerryn Roome**	Malaria in the Late Stages of Pregnancy and the Significance of Tissue Factor
Poster # 156	**Ann Gore**	Improving Efficacy of HIV Vaccines for Immune-Suppressed Recipient
Poster # 157	**Hammad Khalid**	O-Linked Glycosylation Patterns of Cervical Mucins in HIV Infection
Poster # 158	**Elyssa Cohen**	Polysialic Acid Expression in AICAR Treated Mouse Neuroblastoma Cells
Poster # 159	**Lauren Dennison**	Extracellular Vesicle Dependent Transfer of a Virulence Factor Confers Human Infectivity to *Trypanosoma brucei brucei*
Poster # 160	**Jason Kwak**	The Impact of Blood Circulation on Cancer Metastasis Patterns
Poster # 161	**Anjali Kumar**	Analysis of Pancreatic Cancer Biomarkers
Poster # 162	**Sarah Hatton**	Identifying the Monoclonal Antibody Epitope Peptide Expressed on Pancreatic Adenocarcinoma
Poster # 163	**Christopher Whitlock**	How Does Mutagenesis of N-Linked Glycosylation Sites of C6f1 Fragment affect MAb109 Binding?
Poster # 164	**Juhi Varshney**	DARC Expression in Triple-Negative Breast Cancer
Poster # 165	**Kathryn Vollum**	Regulation of DARC Isoforms among Ancestry Groups and Associations with Aggressive Breast Cancer Subtypes

Poster # 166	**Andrea Brown**	Distinct Transcript Isoforms of the Atypical Chemokine Receptor 1 (ACKR1)/Duffy Antigen Receptor for Chemokines (DARC) Gene are Expressed in Lymphoblasts and Altered Isoform Levels are Associated with Genetic Ancestry and the Duffy-Null Allele
Poster # 167	**Isha Dabke**	Pharmacological Inhibitors of Epigenetic Mechanisms Alter Liposome Uptake
Poster # 168	**Thao Le**	Effects of Mitochondrial-Targeted (MitoQ) Antioxidants on the Lipidome of a Transgenic Mouse Model of Alzheimer's Disease
Poster # 169	**Marshall Kastens**	Age Related Metabolism of Pyrethroids in Rat Brain Microsomes
Poster # 170	**Paige Lane**	Efficient Cloning By Temperature Upshift
Poster # 171	**Kikachukwu Okolo**	Structural Characterization of an LTTR in *Acinetobacter baumannii*
Poster # 172	**Vincent Way**	Large-Scale Plasmid DNA Purification for Gene Therapy of Hemophilia B in Dogs
Poster # 173	**Julian Selano**	Development of a Non-Radioactive High Throughput Assay to Detect Thyroid Hormone Uptake in Cryopreserved Hepatocytes in Suspension
Poster # 174	**Kyle Brown**	Examining the Effects of Astrocytes on Chlorpyrifos Metabolism
Poster # 175	**Kyle Mott**	Trace Level Determination of Trichloroethylene in Plasma by Headspace Solid-Phase Microextraction Gas Chromatography/Negative Chemical Ionization Mass Spectrometry
Poster # 176	**Oluwasegun Olorunyolemi**	Sensitive Liquid Chromatography/Mass Spectrometry Method for the Determination of the Lipophilic Anticancer Drug in Rat Plasma
Poster # 177	**Kirsten Allen**	The Effects of Grape and Muscadine Juice on Protein Glycation
Poster # 178	**Kaylyn Bell**	Engineering the Active Site of Histone Acetyltransferase 1
Poster # 179	**John Lee**	Fractionation and Analysis of Wild Type and Galacturonosyltransferase 14 (GAUT14) Knockdown

		Switchgrass Cell Walls to Determine the Structure Synthesized by GAUT14
Poster # 180	**Olivia Mendel**	Proteome and Glycome Profiling of Medaka Exposed to Chronic, Low Level Ionization Radiation
Poster # 181	**Jerin Varghese, Jason Moraczewski, Brittany Tummings**	Proteomic Profiling of a Model Species (Medaka Fish) to Study the Physiological Response to Chronic, Low Level Ionizing Radiation in the Environment
Poster # 182	**Kyle Bowler**	The Enzymatic Characterization of Three Nucleotide-Sugar Aminotransferases in Pathogenic *Bacillus*
Poster # 183	**Lauren Davis**	Regulatory Pathway of X-Polymer Formation in *Bacillus* Species
Poster # 184	**Michael Cheng**	Post Translational Modifications of CaaX-Box Proteins Are Dependent on Specific CaaX Motifs
Poster # 185	**Haeun Kim**	Investigating the Post Translational Modification of CaaX Proteins
Poster # 186	**Rohit Munagala**	Investigation and Structural Inhibition of Rce1 and Ste24 Activity in a Prokaryotic System
Poster # 187	**Justin Dumrongkulraksa**	Identification of CRISPR Adaptation Complexes and Associated Nucleic Acids in *Pyrococcus furiosus*
Poster # 188	**Jesse Hu**	Evaluation of Cas4 Function in CRISPR-Cas Adaptation
Poster # 189	**Jessica Dinsmore**	A Study of Transposon Movement in *C. bescii*
Poster # 190	**Cynthia Ponir**	Yield Improvement of *Pyrococcus furiosus* Soluble Hydrogenase I by Overexpression of Accessory Proteins
Poster # 191	**Monisha Narayanan**	Examining Intercellular Heme Transport via Freixenet Transgenic Zebrafish
Poster # 192	**Adam Aston**	Transcriptional Activity of MGA and Mutation in Zebrafish
Poster # 193	**Bryanna Thomas**	Biological Function of an AAK1-Like Protein Kinase in *Trypanosoma brucei*
Poster # 194	**Haley Vale**	Localization of Casein Kinase 1.2 in *Trypanosoma brucei*
Poster # 195	**James Kraus**	Identifying Genetic Suppressors of ZYG-11

Poster # 196	**Rachel Vaizer**	The Role of Intraflagellar Transport in Ciliary Gliding
Poster # 197	**Leanna Harbor**	*Agrobacterium tumefaciens* Mediated Transformation of *Mimulus nasutus* via the Floral Dip Method
Poster # 198	**David Cowan**	Heterologous Expression of Carbohydrate Utilization Genes from *Acidothermus cellulolyticus* in *Caldicellulosiruptor bescii*
Poster # 199	**Grace Johnson, Mary Abkemeier, Catherine Waldron, Daniel Blumenthal, Vivian Vu**	Knockdown of IFT Proteins Phenotypically Affects Primary Cilia
Poster # 200	**Thomas Layman**	Experimental Evolution and Sperm Precedence in *D. recens* and *D. subquinaria*
Poster # 201	**Dhairya Shukla**	Small Molecule Inhibition of CARM1 in Adipocytes to Control the Epigenome-Induced Risks of Obesity
Poster # 202	**Kitra Cates**	*In Vitro* DNA-Protein Interaction Analyses of *Zea mays* Transcription Factors
Poster # 203	**Madeline Steffensen**	Using Mutants to Understand Mechanisms of DNA Methylation in *Brachypodium distachyon*
Poster # 204	**Zehneel Jiwani**	Feeding Choice Characterization of *Euptoieta claudia* and Oviposition Choice Analyses of *Agraulis vanilla* in Relation to Cyanide Production of *Passiflora incarnata*
Poster # 205	**Atul Lodh**	Investigating the Role of Cyanogenic Glycosides in *Passiflora incarnata* (Maypop)
Poster # 206	**Michael Lopez**	Regulation of Intracellular Membrane Fusion by V-ATPase Subunits
Poster # 207	**Samuel Macfie**	Exploring Alternative Mechanisms of RidA-Independent 2AA Stress Relief
Poster # 208	**William Moxley**	Characterization of murI, racD and racR of *Acinetobacter baylyi*
Poster # 209	**Hirel Patel, Lucas Bougang, Rebecca Buchanan, John Buchanan**	Genetic and Metabolic Modeling the Methanogenic Archaeon *Methanococcus maripaludis*

Poster # 210	**Isabella Tondi Resta**	Determining Gene Products Interacting with RtcB of the rsr-rtcBA RNA Repair Operon via a Synthetic Lethal Screen
Poster # 211	**David Rink**	Synthesis and Surface Engineering of Fe5C2 Nanoparticles for Superior r2 Relaxivity in Liver-Specific MR Imaging
Poster # 212	**Sang Min Lee**	Investigations of Chromium Photocatalyzed Cycloadditions
Poster # 213	**Alexander Winkles**	Theoretical Investigation of the Combustion Chemistry of Acetaldehyde and Ethenol
Poster # 214	**Brett Askins**	Synthetic Iron Oxide Containing HDL Nanoparticles for Atherosclerosis
Poster # 215	**Noah Newman**	Alpha-Tocopheryl Succinate Encapsulated Nanoparticles for the Enhancement of Mitochondrial ATP Production

Program: Tuesday, April 5, 2016

Oral Session V: 9:30-10:45 a.m.
Athena Breakout Rooms A, B, C, D

Room A	**Kayla Alward**	Correlation between Teat End Scores and Presence of Mastitis in the UGA Dairy Herd
	Kendall Lee	The Effect of Supplemental Vitamin E Form on Blood Oxidative Stress Parameters Measured in Exercising Horses
	Joseph Elengickal	Deficiencies and Improvements to Mental Health Institutions in Georgia
	Kayla Hargrove	Assessment of Adult Pig Cognition Utilizing an Open Field and Object Recognition Test
Room B	**Andrew Jarnagin**	When Coca-Cola Grows Citrus on the Nile, Who Wins? Revisiting the Arab Boycott in Egypt
	Jazmine Griffin	Corporate Inversion: Companies Leaving the American Tax System
	Jennifer Hardister	Conference Calls and Tax Forecasting
	Melody Alam	Short Selling Pressure and the Information Disclosure of Corporate Innovation: Evidence from a Policy Experiment
Room C	**Camily Williams**	Love, Lust, and Loyalty: Female Sexuality in the Auchinleck Romances
	Leah Scott	"Brave Little Belgium": The British Home Front Response to Belgian Refugees, 1914-1918
	Aaron Conley	The Effect of Shield Laws on Journalists Acting as Investigators, Specifically at Public Universities
	Kinsey Brooke	The Mythical Realm of Faerie: Dragon-Lore Symbolism and the Literary Elements of Faerie
Room D	**Jackson Hopper**	Digitally Delicate Primes
	Lindsey Spreen	Acceleration of Human Transportation and Its Impacts on Energy Consumption
	George Barron	Quantum Fourier Transform in the Single-Excitation Subspace Method of Quantum Computation
	Joseph Skehan	Designing Chiral Metasurfaces and Understanding their

Optical Properties

Oral Session VI: 11:00 a.m.-12:15 p.m.
Athena Breakout Rooms A, B, C, D

Room A	**Johnathan Mayfield**	An Investigation into the Complex Viral Interactions between *Microplitis demolitor* Bracovirus and TnAV-2a, an Ascovirus
	Alyssa Wuellner	Severity of Cases Admitted into a Small Animal Hospital and the Phase of the Moon
	Kayla Hargrove	Effect of Preoperative Laboratory Testing on Anesthesia-Related Decision Making in Apparently Healthy Dogs
	Lauren Dempsey	A Systematic Review of Adverse Effects Resulting from Administration of Propofol in Domestic Dogs and Cats
Room B	**Xueying Li**	Conjugated Polymers
	Shreya Ganeshan	What Good is a Low-Carbon City if No One Can Afford to Live There?
	Megan Douglass	Caveolae in 3D Neuronal Cell Cultures
	Garrett Steck	An Environmental Engineering Challenge: Improving the Energy Balance of Global Food Production
Room C	**Casey Grippando**	Procedural Polarization: Examining Changes in the Roll Call Voting Record (1877-2012) and their Effects on Political Polarization
	Bryson Culver	Lesbian, Gay, and Bisexual Employment Protection: An LGB-Inclusive Argument for Title VII Sex Discrimination
	Robert Oldham	Coalitional Stability: Apportioning the Legislature at the U.S. Constitutional Convention
	Bert Thompson	The Doctrinal Development of Sea-Launched Nuclear Capabilities
Room D	**Brennan Ninesling**	Role of Human Intelectin-1 in the Innate Immune System
	Ashley Lall	Super-Resolution Microscopy vs. Epifluorescent Microscopy of Aurora Kinase C and SYCP3 Localization in Mouse Oocytes and Spermatocytes

	Tiffany Jenkinson	Expression of Inflammatory and Coagulation Factors in Syncytiotrophoblast BeWo Cells Exposed to *Plasmodium falciparum* Derived Hemozoin
	Andrew Webster	Regulation of Ovarian Cancer by RGS10 and BIN1

Oral Session VII: 12:30-1:45 p.m.
Athena Breakout Rooms A, B, C, D, G

Room A	**Caroline Harvey**	Need of the "Other": Paradox in Gordon Parks' *Airline Terminal* and *American Gothic*
	Christian Lisa	A Romance: A Creative Writing Project
	Katherine Opacity	Tolstoy's Second Epilogue: On Page and Screen
	Jessie Blaeser	Literature and Art: How One Creates the Other
Room B	**Benjamin Leigh**	Foreign Aid: Helping or Hurting Democracy?
	Zoe Condon	The Gendered Risorgimento: How Wealthy British Ladies Ended Up Campaigning for Italian Unification
	William Robinson	Offensive Realism in a World of Hegemons
	Andrew Jarnagin	Understanding the Rise of the Sadrist Movement in Iraq
Room C	**Shannon Griffiths, Brittany Talkin**	Women, Welfare, and Borrowing
	Madison Turner	Blackout, the New Binge: A Case Study on Underage Drinking Patterns at the University of Georgia
	Ana Duron-Fleck	Financial Education in Georgia Public Schools and its Impact on Students' Financial Behaviors
	Duncan Lord	An Analysis of Trends in Difficulties Faced by Beginning Music Educators, with Discussion and Implementation of Effective Classroom Solutions
Room D	**Syed Tahmid**	Administration of Varying Carbon and Nitrogen Sources into a Defined Growth Media for Polysaccharide Secretion in *Bacillus cereus*
	Elizabeth Wilkins, Catherine Callaway	Optogenetic Control of a Neuromuscular Junction Model on a Chip
	Emily Myers	The Role of Trehalose-6-Phosphate Synthase in the

		Development and Transmission of *Cryptosporidium parvum* Oocysts
	Nikhil Gangasani	Enzymatically Preparing Carbohydrates for Development of an Effective Treatment against a Bacterial Pathogen
Room G	**Sarah Cunningham**	The Genetic Network of Circadian Rhythms in *Neurospora crassa*
	Alyssa Wuellner, Kayla Hargrove	Prevalence of Pain in Dogs with Cancer
	Caroline Langley	A Retrospective Study Analyzing the Relationship between Blood Coagulation and Liver Shunts

Oral Session VIII: 2:00-3:15 p.m.
Athena Breakout Rooms A, B, C, D, G

Room A	**Theresa Young**	Poverty and Shame: Implications for Social Work
	Laura Courchesne	Psycho-Social Impact of Drone Strikes on Non-Combatant Populations: The Cognitive Mechanism Underlying Pro-Group Endorsement of Extremist Violence
	Rachel Schwartz	Nazi vs. "Soup Nazi": The Double-Talk of Holocaust Rhetoric
	Chandler Johnston	Silencing in Chicana Literature: How Chicana Women Writers Navigate Marginalization in the Borderlands
Room B	**Kip Lacy**	Xenophobic Ants: Social Form Discrimination in the Tropical Fire Ant
	Katherine Russell	Investigating the Influence of Geospatial Attributes on Spider Species Richness and Diversity
	Jack Owen	Exploring Uncertainty in Models of Mosquito Vector-Borne Disease
	Caroline Spohn	Population Dynamics and the Ecology of the Common Bottlenose Dolphin of the Central Georgia Coast
Room C	**James Tyson**	Testing for a Correlation between History of Shoulder Injury and Functional Movement Screen Score
	Katherine Miller	Results of Gender and Personality Interactions on

		Mobility in a Sample of Older Adults
	Fatima Kamal	The Effects of Two Different High-Fat Diets on Appetite
	Emma Auger	The Effects of Predictable Targets on Saccade Behavior
Room D	**Allie Harbert**	Microwave Synthesis of MOF-5
	Erin Smith	Ecosystem Decomposition Using Fluxes
	Wesley Brown	An Improved Synthesis of a Fundamental MOF Precursor
	Emma Meehan, Doyle Wallace	Implementation of picoSpin(TM) NMRs into Organic Chemistry Teaching Laboratories through Spectral Analysis of Fischer Esterification Products
Room G	**Ruth Schade**	The Effect of Maternal Diet on Gastrointestinal Health of Offspring
	Zack Flagel	Injury Risk of Major League Foul Balls
	Kharine Jean	Education Level May Differentially Buffer Cognitive Decline in Older Adults Based on Race

Oral Session IX: 3:30-4:45 p.m.
Athena Breakout Rooms A, B, C, D, G

Room A	**Laura Courchesne**	The Psychology of Nazism and Genocide: The Role of Religion and Symbolism
	Katherine Nichols	"I Just Wanted a Roof over My Head": Possible Housing Solutions for Asylum-Seekers in Germany
	Kelsey Lowrey	Motherhood, War and Ownership in Bertolt Brecht's "Mother Courage and Her Children" and "The Caucasian Chalk Circle"
	Iva Dimitrova	Oral Histories of the Vazov Machine Works
Room B	**Jordan Berne**	Short-Run Economic Mobility in the Wake of the Great Recession
	Meredith Paker	Psychiatric Drug Use and the Business Cycle
	Andrew Teal	Effects of Campaign Finance on Legislator Polarization
	Ian Van Giesen,	Green Power Solutions for Georgia

	Haidi Al-Shabrawey	
Room C	**Lawrence Towe**	Recycle or Landfill? Assessing the Efficacy of a Green-Themed Intervention
	Danei Ting	Financial Knowledge amongst College Freshmen
	Sarah Williams	New Challenges: ADHD Goes to College
	Rutvik Dmello	The Effects of Inclement Weather on Dining Hall Usage
Room D	**Ashley Biscan**	Androgynous Dress: A Sign of a New American Social Landscape
	Ayman Tartir	Code Switching in Tunisian Arabic
	Taylor Wright	Wedding Apparel: A New Definition
	Bleak Chandler	Can Virtual Reality Lead Us to Learn More about Empathy?
Room G	**Dessa Dunn**	Ecosystem Services and Restoration Efforts of Campus Forests: Tanyard Creek and Driftmier Woods
	James Workman	Divergent Selection in the Context of Source-Sink Dynamics
	Douglas Hart	Effects of Climatic Legacy on Southern Appalachian Plant Communities in Coweeta Basin
	Joseph Walker	Statistically Modelling the Determinants of Pathogen Transmissibility in Humans

Abstracts

Trait Variation in Sunflower Cultivars Grown Under Nutrient Stress Conditions
Insiyaa Ahmed
Dr. Lisa Donovan, Plant Biology, Franklin College of Arts & Sciences

A growing global population has put a strain on the limited arable land and natural resources available to meet crop demand. Starting in the early 1900s, high yield has been achieved through the use of inorganic fertilizers. This high input, high output system has led to environmental and soil degradation while providing no long-term solutions to increase production. Breeding more stress tolerant plants could be key to maintaining high yield while saving resources, preventing further ecological damage, and allowing farmers to use less fertile land for agriculture. This greenhouse study looks at variation in stress resistant traits in 12 sunflower cultivars grown at different nutrient treatments. Variation is necessary for breeding because it allows us to select for traits in the cultivars that coincide with increased tolerance. For the experiment, plants were grown to either the seedling or adult stage and traits relating to growth, physiology, and phenology were measured. Analysis of seedling data shows that there is indeed a high variation in response to different nutrient levels among the 12 lines. There was also variation in beneficial stress tolerant traits within the cultivars; for example, certain lines took fewer days to get to the harvest stage but also had lower whole plant leaf area. Adult plant data is currently being analyzed, but it is expected that there will be similar levels of variation in traits.

Short Selling Pressure and the Information Disclosure of Corporate Innovation: Evidence from a Policy Experiment
Melody Alam, CURO Research Assistant
Prof. Jie He, Banking & Finance, Terry College of Business

This study seeks to analyze shifts in information disclosure about a company's innovations when it is subjected to increased short selling pressure. Short selling is a technique that traders use to profit when they expect a company's share price to decrease. It is regulated in many countries. In 2004 a Securities and Exchange Commission policy experiment tested the effects of relaxing these regulations on 1,000 companies listed on the Russell 3000 index. This move increased short selling pressure on the affected 1,000 companies, which in turn incentivized managers to convince traders that future stock price would not decrease. One result of this policy change was an increase in the company's innovation as measured by the number and quality of patents it produced. I will collect data from the Factiva database on media coverage of the 3,000 companies on the Russell 3000 index for years 2001-2010. Then I will filter to find the proportion of those articles related to a company's innovation. This includes key words like patents, research and development, and intellectual property. We hypothesize that the proportion of articles related to innovation will increase for the affected 1,000 companies after the SEC policy experiment. Information dissemination is the basis of efficient markets—buyers and sellers need to know what a company is doing for its stock price to be accurate. In order for potential short sellers to be convinced of a company's long-term price growth, managers should theoretically ensure increased media coverage of their innovations.

The Effects of Grape and Muscadine Juice on Protein Glycation
Kirsten Allen, CURO Research Assistant
Dr. Phillip Greenspan, Pharmaceutical & Biomedical Sciences, College of Pharmacy

Protein glycation results in the production of advanced glycation end products that contribute to inflammation and have been

linked to diabetic complications and many other aging conditions like Alzheimer's disease. The experiment we conducted tested whether grape or muscadine juice inhibits protein glycation. The formation of glycated protein was performed in incubations containing 50 mg albumin/ml and 250 mM fructose in 200mM potassium phosphate buffer, pH 7.4. The formation of a glycation product, in the presence and absence of 2.5 μL/mL of grape (Welch's Red Grape) and muscadine (Paulk's Pride Muscadine) juices, was measured using a spectrofluorometer set at the wavelength pair, 370/440 nm. After three days of incubation at 37ºC, the samples containing only albumin and buffer averaged a fluorescence of 45 units, and this is considered background fluorescence. When fructose was added to the samples, fluorescence increased to a level of 180 units, an indication of the formation of a fluorescent glycation product. Both grape and muscadine juice inhibited fluorescence, with 2.5 uL juice/mL inhibiting glycation by 27% and 88%, respectively. Both juice samples did produce substantial diminishing of the fluorescence; however, muscadine juice was more effective in inhibiting protein glycation than grape juice. The presence of ellagic acid, a phenolic compound with antioxidant activity, in the muscadine juice is thought to be responsible for this difference.

Examining Diversity in High School Publication Staffs

Jenny Alpaugh, Ramsey Scholar, CURO Research Assistant
Prof. Joseph Dennis, Grady College of Journalism & Mass Communication

As the United States continues to deal with racial tensions, it is important that the media continues to increase diversity in order to properly cover these events from a variety of perspectives. However, diversity remains a problem in the media, with the American Society of News Editors reporting in their 2015 census that the percentage of minority journalists working in daily-newspaper newsrooms falls at 12.76 percent. When the demographics of a nation's journalists fail to represent the demographics of the nation, problems arise in obtaining fair and balanced coverage. This study aimed to discover if problems with minority representation were also present in high school publication staffs. Members of the Journalism Education Association were invited to participate in a 10-question survey which asked advisors to self-report both school and staff demographics. These demographics were then compared to determine if diversity in a school is represented in the school's publication staff with initial analysis suggesting that a school's diversity is not always represented within its publication staff. This lack of representation at the high school level illustrates a problem with diversity that exists in all levels of media.

Correlation between Teat End Scores and Presence of Mastitis in the UGA Dairy Herd

Kayla Alward
Dr. Stephen Nickerson, Animal & Dairy Science, College of Agricultural & Environmental Sciences

Mastitis is an inflammation of the mammary gland caused by bacteria that affects 1 in every 3 cows and costs the producer an average of $180/cow/year. Penetration of bacteria into the teat canal causing mastitic infections may be enhanced by hyperkeratosis, a thickening of the teat canal keratin, which provides a breeding ground for bacteria. The goal of this research project was to determine if a correlation existed between elevated teat end scores (degree of hyperkeratosis) and presence of mastitis and elevated somatic cell counts (SCC). For this study, 30 purebred Holstein cows in early lactation were sampled. Their teat ends were scored on a scale of 1 to 4 according to level of severity, and teat canal

swabs as well as milk samples were collected aseptically from each quarter for microbiological examination. Additionally, milk samples were evaluated for SCC using a DeLaval Cell Counter. The association of teat end score, infection status, and SCC was analyzed using the CORR procedure of SAS. Preliminary analysis of data suggested a relationship between mammary quarter infection status and teat score. Uninfected quarters exhibited an average score of 2.00, whereas the overall average score for infected quarters was 2.42. Among infected quarters, teat scores were CNS – 1.9, streptococcus – 2.0, prototheca – 2.0, *S. aureus* – 2.6, mold 3.0, and *E. coli* – 3.0. Results suggest that teat end hyperkeratosis is associated with the presence of mastitis, and that management practices should be in place to prevent this condition and to promote healthy teat ends.

Hookworm Egg Production in a Virulent Hookworm-Fur Seal System

Ali Anderson, CURO Honors Scholar
Dr. Nicole Gottdenker, Pathology, College of Veterinary Medicine

The South American Fur Seal (SAFS, *Arctocephalus australis*) is a marine mammal that inhabits the southern coasts of South America. While this species is one of the most widely distributed otariids in the world, the populations in the Pacific Ocean have experienced an alarming decline (57%) over the last 20 years. Although the cause of this decline is unknown, hookworm disease plays a significant role in the population dynamics of SAFS. Via necropsies conducted at Guafo Island, or Chilean Patagonia, hookworms were collected from SAFS pups with the aim of studying this host-parasite system, in which the parasite, the hookworm, causes significant damage to the host (high virulence). Since the virulence of this parasite is related to the extraction of host resources (blood), we hypothesize that high virulence correlates with a greater chance of transmission for the parasite. Additionally, we hypothesize that these populations will select for individuals with higher virulence over concurrent generations. In order to determine the effective transmission of this system, we measured the egg production of hookworm females collected from fur seal pups found dead due to trauma or hookworm disease. While results are pending, it is expected that there will be larger numbers of eggs in hookworm females collected from pups that died due to hookworm disease compared to hookworms collected from pups that died due to causes unrelated to hookworm infection (trauma).

Lung Abnormality Detection from Laser Projection Modeling

Sommer Anjum, CURO Research Assistant
Dr. Ramana Pidaparti, College of Engineering

Many respiratory diseases like asthma, chronic obstructive pulmonary disease (COPD), and pneumonia require the estimation of lung parameters that are very crucial in analyzing the health condition of a patient. Most of the available devices in the market perform these measurements invasively, and the non-invasive kinds like laser-based 3D monitoring of the chest wall are subject to issues involving maintenance, portability, and resolution. In addition, these instruments are not capable of performing localized measurements. We are in the process of developing a laser-based portable device capable of measuring respiration dynamics and heart rate non-invasively. The device primarily projects a laser grid onto an area of interest, and the displacement of the grid with time is monitored with an integrated CCD camera. These displacements can be measured precisely to a micrometer level and hence very minute changes in functional residual capacity of lungs can be monitored. Experiments were carried out to see how the respiratory rate can be predicted from well-defined surfaces

mimicking the patient chest. These results are presented in the poster.

Synthetic Iron Oxide Containing HDL Nanoparticles for Atherosclerosis

Brett Askins
Prof. Shanta Dhar, Chemistry, Franklin College of Arts & Sciences

Atherosclerosis is one of the world's most aggressive diseases, claiming over 17.5 million lives per year. This disease is often caused by high amounts of lipoproteins circulating in the blood stream, which leads to plaque formation. Ultimately these plaques can undergo thrombosis and cause heart damage. A major contributor to these vulnerable plaques is macrophage apoptosis. Development of subcellular vehicles that carry contrast and therapeutic agents to the mitochondria within these apoptotic macrophages is attractive for the treatment of atherosclerosis. Previously, our lab reported construction of a biodegradable, synthetic HDL nanoparticle (NP) system that is capable of detecting vulnerable plaques by mitochondrial membrane potential collapse, which occurs during apoptosis. This platform contains a core of poly(lactic-co-glycolic acid) and cholesteryl oleate, with similar hydrophobicity as found in natural HDL. Surrounding this core is a phospholipid layer comprised of 1,2-distearoyl-sn-glycero-3-phosphoethanolamine, along with stearyl-triphenylphosphonium (TPP) cations for detection of mitochondrial membrane potential collapse. On the surface of this lipid layer is an apoA-I mimetic 4F peptide capable of binding cholesterol and participating in reverse cholesterol transport (RCT). A Magnetic Resonance Imaging (MRI) iron oxide-based probe, mito-magneto, was encapsulated within the HDL NPs for potential use in therapeutic monitoring of atherosclerosis by MRI. This platform displays excellent composition, stability, and physiochemical properties required for encapsulation inside the core of the HDL-NPs. Characterization of the potential therapeutic and imaging abilities of these IONP-based HDL-NPs in atherosclerosis can be completed upon conduction of studies to further understand bioimaging, biocompatibility, toxicity, cholesterol efflux properties, and immunogenicity.

Transcriptional Activity of MGA and Mutation in Zebrafish

Adam Aston
Dr. Scott Dougan, Cellular Biology, Franklin College of Arts & Sciences

This study focuses on the normal function of MAX Gene Associated (MGA) transcription factor during zebrafish development as well as its involvement in tumorigenesis. The MGA gene is known to regulate the cell cycle and differentiation not only in zebrafish but also in mice and humans. In order to study the transcriptional activity of MGA in zebrafish, the CRISPR/Cas9 system is utilized to generate a targeted mutation in the T-Box DNA binding site. CRISPR/Cas9 is a genome editing method that utilizes the endonuclease activity of the Cas9 protein guided by the gRNA to cut at the target sequence of interest. Co-injection of the Cas9 mRNA and the T-Box gRNA in embryos can yield mutant phenotypes: a wide array of defects in the heart, tail, and eye development. The embryos are examined at both 24 hours and 48 hours post-fertilization; zebrafish exhibiting mutant phenotypes are documented and photographed. The gRNA injected F0 generation is raised to adulthood. The potential mutants are identified by outcrossing the F0 generation to wild-type zebrafish. DNA from the F1 larvae is extracted, PCR amplified, and T7E1 digested. Once the potential mutants are identified, their progeny are raised for further screening. Homozygous mutant MGA zebrafish are recovered by in-crossing two heterozygous F1. Crossing two homozygous

recessive F2 zebrafish will yield a maternal-zygotic mutant F3 generation. By analyzing the gene expression pattern and morphological defects of mutant fish, the results should allow for a better understanding of MGA regulation and involvement in embryonic development and human cancer.

The Effects of Predictable Targets on Saccade Behavior

Emma Auger
Dr. Jennifer McDowell, Psychology, Franklin College of Arts & Sciences

The ability to see patterns and alter behavior based on those patterns allows individuals to respond efficiently in predictable environments. Saccades, also known as rapid eye movements, are used when studying the influence of cognitive processes such as detection of timing patterns on sensory-motor function. This study investigated subjects' ability to adapt behavior to a predictable, patterned sequence of events by comparing saccade latency on a visually-guided pro-saccade task with random target locations to a predictive saccade task with alternating target locations. In the predictive task, subjects (n=40) performed blocks of trials with different rates of target alternation: 0.1, 0.2, 0.4, or 0.8 Hz. It was hypothesized that the faster the speed of the predictable targets the lower the latency would be, as subjects learned the timing pattern and generated anticipatory saccades. The preliminary analysis shows that at 0.1 Hz latency does not differ significantly compared to the visually-guided saccades. As the target movements get faster, however, the latency in the predictive task decreases. At 0.4 and 0.8 Hz subjects have faster latencies as the block progresses, ultimately having negative latencies as they learn to predict the target motion before it occurs. In conclusion, faster alternations in the predictive task allow subjects to construct internal representations of target timing patterns and to react more quickly to the change in target location than in a visually-guided pro-saccade task. This information supports the notion that cognition, in this case prediction of patterns, influences motor function and causes adaptive behavior.

Practice Makes Perfect: A Capuchin Monkey Becomes Skillful at Nut Cracking with an Unfamiliar Stone

Rhianna Baldree, Emily Unholz, Margaret Bergmann
Dr. Dorothy Fragaszy, Psychology, Franklin College of Arts & Sciences

Skill is defined as fluid and effective performance of a specific action, or set of actions, under varying circumstances. Wild bearded capuchin monkeys typically crack tough palm nuts by placing them on a log or stone anvil, and striking them with stone hammers that weigh a considerable portion of a monkey's body mass. To evaluate nut-cracking skill, we videotaped an adult male using an unfamiliar stone hammer of an average weight and size. We documented the monkey's behavior with the stone during nut cracking in slow-motion playback. We coded three exploratory actions with the stone (preparatory lifts, spins, and flips), the position of the monkey's hands on the stone each time it moved the stone, the angle of the strike, and outcome (stone dropped, nut cracked). We determined the frequency of actions and outcomes for the first 100 strikes of this monkey and reported that the monkey cracked 31 nuts in 100 strikes and produced between exploratory actions. Proportions of the three exploratory actions were also recorded, with .73 in spins per strike, .36 in flips per strike, and .38 in preparatory lifts per strike. The monkey rarely performed unskillful actions. As more strikes occurred, the number of exploratory actions decreased. We interpret the decrease in these actions across practice as an indication that the monkey became more familiar with the stone and therefore more skilled at using it,

increasing the efficiency. We also determined that exploratory actions may help with positioning the stone for an effective strike.

Quantifying Muscle Function in a Previously Fatigued Muscle

Rebecca Baltenberger
Dr. Kevin McCully, Kinesiology, College of Education

A clinically relevant muscle endurance test using electrical twitch stimulation and accelerometry has been developed. Our aim was to characterize the endurance index (EI) of an endurance test in a previously fatigued muscle. We hypothesized that a supermaximal electrical current for muscle twitch accelerometry could be identified, and that maximal acceleration and the endurance of the muscle after a 5-minute test would be altered in a previously fatigued muscle. *Methods:* We tested males and females. Acceleration was measured using an accelerometer placed over the trapezius muscle. Supermaximal current was measured using electrical stimulation on the trapezius at 4Hz for 1-second intervals at progressively increasing current. Fatigue was produced with 5-minutes of 6Hz stimulation. EI was calculated as the difference between the start and the end values. Fatigue was induced using shoulder shrugs with weights to exhaustion. The EI was measured both after exercise and during a rested state and compared. *Results:* Acceleration leveled off with tolerable current levels. After shrugs, the initial acceleration at the start of the test was only 21% of the non-fatigued acceleration ($p < 0.05$). The EI was 39% +/- 17% in the rested and 190% +/- 154% in fatigued muscle ($p = 0.033$). *Conclusions:* We produced a supermaximal stimulus that may allow us to identify previously fatigued muscle. The decline in initial acceleration observed following exercise influenced the EI, which could potentially confound tests of clinical populations. Future studies need to address the impact of fatigue if we are to use the EI on clinical populations.

The Narrative Retelling of Marginalized Ancient Greek Mythological Characters by Contemporary Female Authors

Manisha Banga
Dr. Benjamin Wolkow, Classics, Franklin College of Arts & Sciences

This research examines marginalized characters from ancient Greek mythology in the context of work by contemporary female authors. Specifically, it examines the phenomenon in which contemporary female authors retell the stories of ancient Greek characters who were sidelined in their myths—usually without agency and often without personality or complexity. When female authors reimagine these characters, they provide new character depth which the ancient mythology does not present. The texts examined will include Anne Carson's *Autobiography of Red*, Sarah Ruhl's *Eurydice*, and Cherríe Moraga's *The Hungry Woman: A Mexican Medea*. These texts reinvent the ancient characters of Geryon, Eurydice, and Medea by delving into their characters on a deeper narrative level by virtue of a defined three-part pattern in which modern authors villainize the ancient heroes, humanize marginalized characters, and finally reveal a corruption of the marginalized character by the hero. This research will employ classical, literary, and feminist analyses both on the ancient mythology and on contemporary work in order to understand the connection between the works in context of their relation to both time period and gender. The researcher argues that female authors retell stories of marginalized characters due to a sympathy derived from the general marginalization of female characters in contemporary art, literature, and culture.

Abstracts

Comparing Meiotic Spindle Structure and Chromosome Attachment in Control and Pericentrin-Depleted Mouse Oocytes

Wendi Bao
Dr. Maria Viveiros, Physiology & Pharmacology, College of Veterinary Medicine

Errors in meiotic division in oocytes can lead to aneuploidy, a major cause of genetic disorders such as Down syndrome and pregnancy loss in women. While accurate chromosome segregation depends on stable spindle formation and correct chromosome-microtubule interactions, the regulation of these critical processes is not well defined. In previous studies, we identified an important role for pericentrin (Pcnt) in meiotic spindle stability and developed a unique transgenic mouse model in which *Pcnt* is knocked down exclusively in oocytes to test its function *in vivo*. Pericentrin is a key scaffolding protein that associates with microtubule organizing centers (MTOCs). The objective of this experiment was to compare the spindle structure and chromosome configurations between control and Pcnt-depleted ovulated (Metaphase II-stage) oocytes collected from control and transgenic (Tg) females. The oocytes were simultaneously immunostained with anti-pericentrin and anti-acetylated a-tubulin antibodies, then counterstained with DAPI to assess Pcnt expression as well as the spindle microtubules and chromosomes, respectively. Specific measurements of spindle pole diameter and inter-pole length revealed differences in the Pcnt-depleted group. Notably, the meiotic spindles in Pcnt-depleted oocytes were significantly shorter with relatively broader, less focused spindle poles. Spindle organization was also disrupted in a significant percentage of the oocytes. Moreover, Pcnt-depleted oocytes exhibited a high incidence of lagging chromosomes, indicative of chromosome-microtubule attachment defects. These meiotic errors can potentially lead to aneuploidy. Hence, our data support an important role for pericentrin in the regulation of stable spindle formation and chromosome attachment, necessary for accurate meiotic division.

Quantum Fourier Transform in the Single-Excitation Subspace Method of Quantum Computation

George Barron, CURO Research Assistant
Dr. Michael Geller, Physics & Astronomy, Franklin College of Arts & Sciences

The primary question of our research is "What does the Hamiltonian for the unitary operator associated with quantum Fourier transform look like?" The primary result of the paper is that we determined an analytical expression for the Hamiltonian and present possible applications, including applications to quantum chaos. To accomplish this, we apply results in linear algebra. The significance of this development is that it allows the quantum Fourier transform to be applied in one step in the single-excitation subspace method of quantum computation.

Development of Immunologic Reagents for the Ferret Animal Model

Camille Bauer
Prof. S. Mark Tompkins, Infectious Diseases, College of Veterinary Medicine

The study of influenza disease and immunity in humans is complicated by the multitude and variety of encounters during a lifetime. Accordingly, influenza researchers have developed animal models of influenza infection and immunity, including mice and ferrets. While the mouse model benefits from precise genetics and many immunological reagents, it is widely recognized that mice do not adequately model infection or transmission of influenza. The ferret is a superior model for transmission and pathogenicity and offers major advantages for understanding, preventing, and modulating the course of influenza. Despite the utility of

the ferret, it is underutilized. One recent review noted that "the major drawback to the more widespread use of the ferret as a model for influenza has been the lack of immunological reagents." The objective of this research is to develop validated reagents and protocols to study ferret cellular and immunological responses to influenza infection. Specifically, recombinant ferret proteins are being used to generate novel monoclonal antibody (mAb) reagents. Candidate mAbs will be tested for reactivity to recombinant ferret proteins expressed in the laboratory or provided by collaborators. Leading mAb candidates will be validated for reactivity using ferrets cells and tissues. We have generated plasmids encoding cDNAs for a panel of recombinant ferret proteins and included a 6x Histidine tag (6xHis), enabling detection and purification of the ferret proteins. The cDNAs have been confirmed by sequencing and we are now transfecting HEK293 cells for stable expression of the ferret proteins. Protein expression will be confirmed by multiple assays, including Western blot and immunohistochemistry (IHC), using 6xHis-specific antibodies, and then purified using the 6xHis tag, as well. These proteins and proteins from collaborators are being used to generate mAb, which will be screened for specificity using the recombinant proteins and validated using native antigens from ferret cells and tissues. The long-term goal is to develop ferret-specific mAbs for use in flow cytometry, ELISA, Western blot and other antibody-based assays, which in turn will be used for infectious disease and vaccine studies in the ferret model.

The Effect of Social Comparison on College Students' Attitudes toward Debt and Their Ability to Delay Gratification

Elliott Beale
Dr. Brenda Cude, Financial Planning, Housing & Consumer Economics, College of Family & Consumer Sciences

The research question I will answer is: "how does social comparison/peer pressure affect college students' attitudes toward debt and their ability to delay gratification?" I hypothesize that the students who compare themselves more to their peers and give in to peer pressure easily will be more accepting of debt and will not be able to delay gratification as well as students who do not compare themselves to others and do not give into peer pressure. I will research this question using data collected by Dr. Cude from college seniors in her classes since 2008. I will control for gender, financial knowledge, current financial situation, involvement of parents in financial education, confidence in financial knowledge, and previous financial education. I will use a scale used by Ray and Najman to measure delay of gratification, a scale used by Davies and Lea to measure attitudes toward debt, a scale used by Norvilitis and Maclean to measure parental involvement in financial education, a scale used by Norvilitis and Mao to measure confidence in financial knowledge, and a scale used by Gibbons and Buunk to measure social comparison. Financial knowledge and all other variables will be measured by student self-assessment and/or response to a survey question. By discovering the answer to this question, we will be better able to understand which college students are more at risk to make bad financial decisions.

Engineering the Active Site of Histone Acetyltransferase 1

Kaylyn Bell
Dr. Y. George Zheng, Pharmaceutical & Biomedical Sciences, College of Pharmacy

Histone acetyltransferase (HAT) enzymes regulate gene expression by transferring the acetyl group from acetyl-CoA to specific lysine residues of histones. However, recent studies provide evidence that HATs may provide for the intimate connection between epigenetics and metabolism, acting upon thousands of substrates exclusive of histones.

These proteins play key roles in posttranslational modification, cellular metabolism, and a multitude of other pathways in cell physiology, as well. My objective is to engineer the active site of histone acetyltransferase 1 (HAT1) via site-directed mutagenesis, in order to ultimately identify some of the enzyme's many substrates by conducting enzymatic activity assays. This will provide molecular insights into the biological functions of HAT enzymes and may lead to the development of novel bioorthogonal probes for further investigation.

Thinking Geographically in Regards to Power Dynamics of the Social Environment: Its Effect on Health

Catherine Bernard
Dr. Andy Herod, Geography, Franklin College of Arts & Sciences

Behavior, as it relates to health outcomes, is best predicted through socio-historical interactions, weighted by scale, which provide context to current interactions and seemingly intangible power dynamics that make up the social environment. Through a stance that is dialectical and non-judgmental, making use of critical reflection, successful and functional solutions that address the maladaptive appropriation of stimuli by the individual may be created. Health is correlative with the degrees of power of individuals. The nature of these power dynamics is that they are internalized and constantly re-established through habitual behaviors, reaffirming geographically contingent social constructions. Behavior is geographically contingent, meaning people at specific spaces and times have certain avenues and resources available to them for behavior to be enacted based on a myriad of environmental, socio-historical, and biological factors. This lens provides a more holistic approach to the understanding of behavior, particularly maladaptive behavior that can result in physical health problems. The purpose of this paper is to argue the interpretive value geographers provide in regards to behavior and health is both warranted and necessary in health studies and policies.

Short-Run Economic Mobility in the Wake of the Great Recession

Jordan Berne, CURO Research Assistant
Dr. Robert Nielsen, Financial Planning, Housing & Consumer Economics, College of Family & Consumer Sciences

The goal of this research is to identify short-run correlates of upward and downward wealth mobility in the aftermath of the Great Recession. The paper investigates individual components of wealth that are relevant to the causes and consequences of the recession (i.e. housing wealth and stock market holdings), along with a composite indicator of a household's net worth. Using panel data from the 2008 Survey of Income and Program Participation (SIPP), a series of two-period conditional logistic regressions is constructed to understand the correlates of household wealth mobility. This research fills a gap in the literature on wealth mobility since the recession and will inform the policy debate on how to increase upward mobility and decrease downward mobility. The results suggest that household upward mobility was greatest among those that weren't poor, lived in the South, lived in metropolitan areas, and were employed full time. Increasing educational attainment, improving outcomes for single-parent households, and helping households navigate housing markets may reduce downward mobility.

Androgynous Dress: A Sign of a New American Social Landscape

Ashley Biscan
Dr. Katalin Medvedev, Textiles, Merchandising & Interiors, College of Family & Consumer Sciences

Gender was at the forefront of discussion in 2015, both inside and outside of the fashion industry. Political, social, and retail actions have all been instrumental in breaking down the gender binary in the United States. Recently, fashion's culturally intuitive industry has turned androgynous dress into more than an avenue of personal expression; it created a national (and global) trend, affecting both the LGBT community and heterosexuals. To analyze this occurrence I studied a variety of sources. First, to examine the historical development of the rise of androgyny in today's culture I reviewed numerous academic texts. Next, I looked for proof for the expansion of the new trend in periodicals and by examining current designer collections. My aim was to curate evidence from a combination of sources to understand that the increasing mass acceptance of androgynous dress practices is reflective of dramatic social changes in the United States. I have grouped my findings into sections based on how they relate to fashion cycles, social reform, marketing, and celebrity endorsements. After analyzing my data, I arrived at the conclusion that the simultaneous progress of LGBT freedoms of the 21st century and the rise of androgynous dress as a style trend is more than coincidental. Together, they push and pull each other to help construct a more egalitarian culture. Today, androgyny is truly in fashion in America both literally and politically.

The Role of Chondroitin Sulfate Glycosaminoglycans in Glioma Cell Progression

Nicole Bisel, CURO Graduation Distinction, CURO Research Assistant
Dr. Lohitash Karumbaiah, Animal & Dairy Science, College of Agricultural & Environmental Sciences

Glioblastoma multiforme (GBM) is an aggressive, devastating type of brain tumor characterized by a highly invasive nature. Chondroitin sulfate proteoglycans (CSPGs) and their glycosaminoglycan (GAG) side chains are important elements in the brain extracellular matrix (ECM) and have been implicated in promoting tumor invasion. However, conclusive evidence to suggest CSPGs or the associated CS-GAGs induce brain tumor invasion is currently lacking. We aim to provide evidence suggesting that tumor cell invasion can be influenced by the level of sulfation of CS-GAGs in the tumor ECM. This was tested *in vitro* by encapsulating the glioblastoma cell line U87MG-EGFP into CS-A (4-sulfated), composite CS-A/E (4,6-sulfated), hyaluronic acid, and agarose hydrogels. We hypothesize that the sulfation of CS-GAGs influences tumor cell migration, potentially through a chemokine-mediated mechanism. Choice assays using microfluidics devices showed preferential cell migration into composite hydrogels ($p<0.05$). Immunohistochemistry for the cytoskeletal components FAK and vinculin demonstrated that cells encapsulated in CS-GAG gels show significantly more colocalization than control treatments ($p<0.05$). Chemotaxis assays with the chemokine SDF-1α suggest that, after three hours, GBM cells migrate further into composite gels containing SDF-1α than those without, displaying potential for chemokine-GAG affinity ($p<0.05$). Sandwich ELISA assays to determine SDF-1α binding affinity and qRT-PCR assays are ongoing to establish a molecular basis for SDF-1α mediated migration of U87MG cells in CS-GAG matrices. If glioma malignancy is influenced by the level of sulfation of CS-GAGs, this work could contribute to development of novel therapies for brain cancer and lead to improved patient prognoses in clinical medicine.

The Effect of Form and Source on Bioavailability of Vitamin E Supplementation in Mature Horses

Marrissa Blackwell

Dr. Kylee Duberstein, Animal & Dairy Science, College of Agricultural & Environmental Sciences

Vitamin E (alpha-tocopherol) is an essential nutrient for all horses that has an integral role in preventing excessive production of free radicals that can cause major damage to cell structures. Uncontrolled oxidative stress can inhibit the horse's ability to combat the imbalance between production and removal of free radicals, resulting in tissue damage and, most recently discovered, degenerative disease. Since alpha-tocopherol is not synthesized by the horse, it is a crucial nutrient for all types of equine diets. Vitamin E can be found in natural sources through green pastures, alfalfa, and other quality roughages, as well as in synthetic forms, such as liquid or powder supplementation. However, due to structural differences, absorption rates and effectiveness of alpha-tocopherol can vary. The objective of this study was to compare the bioavailability of natural and synthetic forms of Vitamin E. In this study, we utilized sixteen mature horses, previously housed on pasture. Horses were confined to stalls with minimal turnout to a dry lot (2-4 hrs/day) for a two-week washout period prior to the start of the trial. Horses were then randomly assigned to one of four treatment groups (Group 1 = synthetic acetate powder, Group 2 = natural acetate powder, Group 3 = Emcelle Powder, Group 4 = Emcelle Liquid), and then placed on a two-week feeding trial. Plasma was collected pre-feeding on days one, seven, and fourteen and four hours post-feeding on days one and fourteen to measure vitamin E levels.

Literature and Art: How One Creates the Other

Jessie Blaeser
Dr. Simon Gatrell, English, Franklin College of Arts & Sciences

For this research project, I will answer the following question: what relationships exist between painting and literature? Specifically, I am studying literature and art in England between 1820 and 1920 with works ranging from the paintings of J.M.W. Tuner to the Modernist movement. The purpose of this study includes three key elements: to develop a holistic understanding of literature that has been influenced by artistic movements, to discover how and why artistic movements influence literature, and to gain an understanding for how works of literature can influence and inspire works of art. Writing is meant to create images within a reader's mind's eye; therefore, I am investigating how literature is influenced by images themselves, and conversely, how images fuel pieces of literature. Although some research has been done on this topic, I will bring my own experience as a student of English and art to analyze individual paintings, novels, plays, and poems. My method of study will involve closely reading the poems, plays, and novels that have been tied to specific artists or artistic movements. Then, I will study the paintings that I believe have inspired or influenced these works of literature. After studying each, I will form my own conclusions on how one form of expression has influenced the other. For this presentation, I will be looking specifically at the paintings and poetry of William Blake and Dante Gabriel Rossetti.

Mineralogy and Petrology of Huerfano Butte: A Tertiary Intrusion on the Great Plains, Colorado

Joe Booth
Dr. Michael Roden, Geology, Franklin College of Arts & Sciences

Huerfano Butte, an alkali gabbro igneous intrusion located in the Great Plains of eastern Colorado, has been dated by K-Ar methods to be 25.2 million years old making this one of the most recent magmatic events in the Great Plains and placing it in the same

time frame as the famous dikes and plutons of Spanish Peaks, CO. Most likely, Huerfano Butte is a satellite intrusion of Spanish Peaks. It is composed of felsic and mafic rocks. The mafic rocks contain small felsic segregation veins representing the last portion of the melt to crystallize. Huerfano Butte likely formed by mantle melting related to the Rio Grande continental rift as recently inferred for some dikes in Spanish Peaks. The purpose of this study is to determine mineral compositions in both felsic and mafic rocks in order to understand crystallization history, and to place Huerfano Butte in the context of Tertiary magmatism in the western U.S.A. Compared to the dikes at Spanish Peaks, the rocks from Huerfano Butte are coarser-grained and fresh, allowing a more complete study of crystallization history. Samples were collected during the UGA/USC geology field school course in 2015 and analyzed using the JEOL electron microprobe housed in the Department of Geology at UGA. Olivine compositions range from Fo 71 to Fo 80 confirming a mantle origin, whereas other minerals track the evolution of the magma as it crystallized. Most intriguingly, apatite, amphibole, and mica contain significant H2O, indicating a hydrous magma consistent with a link to Spanish Peaks.

Assessing the Costs of Investments in Immunocompetence on the Fitness of *Hemigrapsus sanguineus*

Sydney Alyce Bourget, CURO Honors Scholar
Dr. Jeb Byers, Odum School of Ecology

Hemigrapsus sanguineus, commonly known as the Asian shore crab, is a highly invasive species that is native to the island of Japan and other coastlines in Asia. Found in Asian shore crabs' environment are rhizocephalan parasites, which often infect and castrate the crabs. This elicits an immune response in the crabs in which they attempt to phagocytize the foreign bodies through encapsulation. This study seeks to determine how infection impacts the fitness of the crab, specifically its metabolic rate. Crabs were infected with an immune response inducing bacteria for a span of 48 hours and then their metabolic rates were measured. The metabolic rates were measured before and after infection. The number of circulating blood cells and the effectiveness of the crabs' immune response were also measured after the infection process. Although data collection is still underway, increases in metabolic rates after infection are expected to be observed. Additionally, we also predict that there will be a positive correlation between the number of circulating bloods cells and the effectiveness of the immune response. This research is significant because the Asian shore crab's invasive range is the northeastern coast of the United States. These crabs are decreasing the biodiversity of these coastal ecosystems and are feeding upon commercially important species like the larvae of lobsters and blue shellfish. Thus, gaining a better understanding about this organism is extremely important in order to ultimately eradicate it from these areas.

The Enzymatic Characterization of Three Nucleotide-Sugar Aminotransferases in Pathogenic *Bacillus*

Kyle Bowler
Dr. Maor Bar-Peled, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Sugar-conjugated macromolecules, or glycans, play significant roles in cell-to-cell recognition, binding to the extracellular matrix, and pathogenicity. Glycobiology has become an increasingly popular and medicinally relevant field of study, as there are more than 100 known human diseases related to glycan metabolism. Glycan synthesis requires the formation of diverse nucleotide-sugars. This work describes the formation of amino-nucleotide-sugars in the gram-positive

endospore forming bacterium *Bacillus cereus*. I have identified and characterized three NDP-4-keto-4-aminotransferases in *Bacillus* to gain insight on their levels of catalytic interplay and promiscuity. The aminotransferase genes, RBTH_04255, Bc5273, and Bc1944, were cloned into *E. coli*-compatible plasmids. Transformed *E. coli* were induced to express recombinant protein, which was harvested and purified. Assays were developed to characterize enzymatic activity in terms of substrate/cofactor specificity, buffer/pH specificity, optimal temperature, ideal nitrogen donor source, and ideal pyridoxal and redox groups. Enzymatic products were analyzed via liquid chromatography coupled to mass spectrometry and were confirmed by the fragmentation of nucleotide-mono-phosphate. Enzymatic "% Conversion" was calculated by dividing the integral of eluted product by the sum of the integral product and integral substrate. Bc5273 and Bc1944 were able to convert RBTH_04255's established substrate, UDP-4-keto-6-deoxy-L-AltNAc, to UDP-4-amino-6-deoxy-L-AltNAc at approximately 20% catalytic efficiency. Each aminotransferase was able to convert UDP-4-keto-6-deoxy-D-glucose to UDP-4-amino-6-deoxy-D-glucose. These results indicate an exciting amount of interplay in NDP-sugar metabolism *in vitro*, which demonstrates that proteins are capable of having broad and promiscuous catalytic activities. Future studies are required to better understand the regulation and biological role of these three aminotransferases in *Bacillus*.

Marijuana Use, Nutritional Behaviors, and Educational Attainment in U.S. School-Aged Youth

Ashley Bradford, CURO Research Assistant
Dr. Grace Bagwell Adams, Health Policy & Management, College of Public Health

Over the past decade as state laws regulating the sale and possession of marijuana have undergone significant changes, concern has increased over the impact of liberalization on youth marijuana use. Simultaneously, rates of youth obesity have increased substantially over time. Further, substance use, body image, and nutrition are individually known to be inputs into health and educational production functions for high school youth. However, relatively little is known about the interaction between these factors in health and educational achievement. In this paper we will use data from the Youth Risk Behavior Survey (YRBS) from 1995 to 2013 to study the interaction between marijuana use and nutritional inputs (including healthy eating and exercise) on BMI and on self-reported grade point averages. The underlying conceptual model assumes youth maximize utility across health (proxied by BMI) and school performance (proxied by GPA), where BMI and grades are the outputs of a household production function that has marijuana use, healthy foods, and exercise as inputs. The analysis data contains a representative sample of over 800,000 high school youth from 39 states over the 1995 to 2013 time period. Our models will control for potential endogeneity of the input demand decisions in the BMI and grade production functions using standard instrumental variables methods. Finally, we will discuss the potential policy interventions available to mitigate the adverse consequences of risky youth behaviors and nutritional deficits, and how those policies may differentially affect minority populations.

The Hijab as a Feminist Tool of Agency

Catherine Braun
Dr. Katalin Medvedev, Textiles, Merchandising & Interiors, College of Family & Consumer Sciences

The hijab and the practice of veiling within Islamic culture have been subject to ongoing negative criticism, shaped mostly by exclusionist Eurocentric viewpoints. In the wake of 9/11, many Americans began to view

the hijab as a symbol of an oppressive part of the world. Although the hijab is enforced by many fundamentalist regimes, it is forbidden and penalized by others. Whatever the case may be, wearing the hijab can be a highly personal choice for Muslim women, shaped by political ideology, cultural identity, and modesty. This paper identifies the shifting global trends of hijab wearers and discusses disparate meanings of this dress item for different wearers. In Turkey, for example, Muslim women have often covered themselves to distinguish themselves from the ideological viewpoints of different family members. To better understand the hijab as a tool of empowerment, I have reviewed academic articles and memoirs of hijab wearers. My objective was to identify the positive aspects of veiling. Although it is difficult to measure the exact potential of the hijab as a feminist tool, attempts for the normalization of veiling practices can be detected in social media platforms among millennials and Generation Z members. While women will likely continue to be judged for their appearance, alternative social media representations of veiled women appear to have the potential to jumpstart a dialogue in which such a controversial sartorial phenomenon may find new interpretations.

The Mythical Realm of Faerie: Dragon-Lore Symbolism and the Literary Elements of Faerie

Kinsey Brooke
Dr. Jonathan Evans, English, Franklin College of Arts & Sciences

Characters of the dragon and the dragon-slayer are important symbols in popular themes found in medieval myths and fantasy literature. This project purposes to answer the question, "What are the literary elements of Faerie, and how do they relate to the evolution of dragon-lore and J.R.R. Tolkien's adaptation of these themes?" An inquiry reveals Tolkien's interpretation of what constitutes a fairy story and what defines the broader realm of Faerie. It further contributes to the body of research investigating the symbolic importance of the dragon and dragon-slayer legends and the fantasy worlds in which those tales take place. The focus of the research includes exploration of dragon myths, the historical influences of medieval social customs, the adaptation of dragons in fantasy literature, and the expansion of their portrayals in the works of Tolkien. Additionally, it elaborates on the attributes of dragons from their first conception. I examined the way in which Tolkien used these subjects and adapted them into his stories through survey of his essay "On Fairy Stories" and other literary works. Scholarly articles from other sources were also consulted. In conclusion, the features of dragons are not static but have morphed over time, varying depending on the author's imagination, and the realm of Faerie is given very few literary limits thus adding to the author's flexibility when composing a fairy story.

Distinct Transcript Isoforms of the Atypical Chemokine Receptor 1 (ACKR1)/Duffy Antigen Receptor for Chemokines (DARC) Gene are Expressed in Lymphoblasts and Altered Isoform Levels are Associated with Genetic Ancestry and the Duffy-Null Allele

Andrea Brown
Dr. Melissa Davis, Genetics, Franklin College of Arts & Sciences

The Atypical ChemoKine Receptor 1 (ACKR1) gene, better known as Duffy Antigen Receptor for Chemokines (DARC or Duffy), is responsible for the Duffy Blood Group and plays a major role in regulating the circulating homeostatic levels of pro-inflammatory chemokines. Previous studies have shown that one common variant, the Duffy Null (Fy-) allele that is specific to African Ancestry groups, completely removes expression of the gene on erythrocytes;

however, these individuals retain endothelial expression. Additional alleles are associated with a myriad of clinical outcomes related to immune responses and inflammation. In addition to allele variants, there are two distinct transcript isoforms of DARC which are expressed from separate promoters, and very little is known about the distinct transcriptional regulation or the distinct functionality of these protein isoforms. Our objective was to determine if the African specific Fy- allele alters the expression pattern of DARC isoforms and therefore could potentially result in a unique signature of the gene products, commonly referred to as antigens. Our work is the first to establish that there is expression of DARC on lymphoblasts. Our data indicates that people of African ancestry have distinct relative levels of DARC isoforms expressed in these cells. We conclude that the expression of both isoforms in combination with alternate alleles yields multiple Duffy antigens in ancestry groups, depending upon the haplotypes across the gene. Importantly, we hypothesize that DARC isoform expression patterns will translate into ancestry-specific inflammatory responses that are correlated with the axis of pro-inflammatory chemokine levels and distinct isoform-specific interactions with these chemokines. Ultimately, this work will increase knowledge of biological mechanisms underlying disparate clinical outcomes of inflammatory-related diseases among ethnic and geographic ancestry groups.

Examining the Effects of Astrocytes on Chlorpyrifos Metabolism

Kyle Brown, CURO Research Assistant
Dr. Michael Bartlett, Pharmaceutical & Biomedical Sciences, College of Pharmacy

Chlorpyrifos (O,O-diethyl O-[3,5,6,-trichloro-2-pyridyl] phosphorothionate, CPF) is a widely used organophosphate insecticide. CPF is utilized as an insecticide, and its activity and toxicity is due to the irreversible inhibition of acetylcholinesterase. Chlorpyrifos is metabolized by Cytochrome P-450 (CYP) into chlorpyrifos-oxon (O,Odiethyl-O[3,5,6,trichloro-2-pyridinly]phosphate, CPO) and 3,5,6,-trichloro-2-pyrinidol (TCP). CPO is approximately 3,000 times more potent than CPF and leads to neurotoxicity. TCP is nontoxic and is eliminated in the kidneys. Methods have been developed to quantify chlorpyrifos and its two metabolites by column liquid chromatography/electrospray ionization tandem mass spectrometry (LC/ESI-MS/MS). Preliminary data showed the detoxification of CPF into TCP in the presence of astrocytes. An increase in TCP levels was observed in cell culture medium in the presence of astrocytes, but was inhibited in the presence of CYP inhibitor SKF525A. This suggested that astrocytes have the ability to metabolize and detoxify chlorpyrifos, and the metabolism could be inhibited by the CYP inhibitor. This poster will discuss quantitative data obtained from the co-culturing of neurons with astrocytes in the presence of CPF and how astrocytes affect the metabolism of CPF into CPO and TCP.

An Improved Synthesis of a Fundamental MOF Precursor

Wesley Brown, CURO Research Assistant
Dr. Douglas Jackson, Chemistry, Franklin College of Arts & Sciences

As the first step in a multi-step synthetic project, the synthesis of methyl 10-nitro-9-anthracenecarboxylate is critical to the foundation of the organic linker needed to complete the construction of a hybrid molecular switch to metal-organic framework, or MOF. To synthesize this methyl ester, esterification of 9-anthracene carboxylic acid was implemented in methanol and sulfuric acid, and the reactions completed to various yields. However, rather than pursuing conventional synthetic routes for this reaction, such as oil-bath reflux, microwave irradiation was implemented to greatly reduce

the time table of this reaction. A more successful esterification was achieved by first converting 9-anthracene carboxylic acid to the acyl chloride, and then immediately converted to the desired methyl 9-antrhacenecarboxylate with the addition of methanol in acidic conditions. Following the successful esterification, methyl 9-anthracenecarboxylate was nitrated to methyl 10-nitro-9-anthracenecarboxylate by way of the creation of the nitronium ion in sulfuric acid and an acetic acid/acetic anhydride solution. Current methods improve upon the literature in terms of reduced reaction time, improved yield, and purity.

Characterization of *Bacillus thuringiensis* Cry51Aa Toxicity to *Lygus*

Darcie Bruce, CURO Summer Fellow, CURO Research Assistant
Prof. Michael Adang, Entomology, College of Agricultural & Environmental Sciences

Tarnished Plant Bugs, *Lygus lineolaris*, have emerged as major global crop pests. This group of bugs in the Order Hemiptera has piercing-sucking mouth parts, stylets that puncture plant cells and remove cellular contents. These species are cosmopolitan pests of high value crops. During the early bud and bloom stage, feeding by these insects causes bud and flower loss, reducing yield on stone fruits such as peaches, and a number of agricultural row crops including cotton. Recently, the structure of Cry51Aa was solved by collaboration with the Adang laboratory. Based on the discovery by Baum et al. (2012) that a Cry51A-typetoxin has toxicity to *Lygus*, I tested Cry51Aa for *Lygus* activity in the 2015 Summer and Fall semesters. This involved developing an effective bioassay method and then using bioassays to determine Cry51Aa toxicity to *L. lineolaris*. My goals for this semester are: 1) determine the Lethal Concentration50 (LC50) value for Cry51Aa against *Lygus*, 2) conduct a *Lygus* bioassay with activated Cry51Aa toxin, 3) using fluorescently labeled Cry51Aa toxin, image toxin binding and damage to gut tissue in *Lygus* nymphs by confocal microscopy. The data will provide basic information on toxin interaction with the *Lygus* gut, and will guide the optimization of Bt Cry51Aa toxin for enhanced activity against *Lygus* and other hemipteran pests.

Diabetes Self-Education App

Ben Burgh
Dr. Kyle Johnsen, College of Engineering

Diabetes mellitus is a metabolic disorder affecting almost 400 million people worldwide. In order to help these people understand how their actions (i.e. adhering to their medication, diet, and exercise regimes) can affect their health, we constructed a mobile application to promote patient knowledge and keep track of their well-being. The primary means of accomplishing this is a "What If" simulation which visually demonstrates to users how different behaviors would hypothetically improve or degrade their health. Users would be encouraged, both by the application and their doctors, to live a healthier lifestyle. Our question is, are patients willing, or even able, to educate themselves through this application?

Spatial and Temporal Iron Isotope Fractionation in Hawaiian Soils

Shannon Burns, CURO Graduation Distinction, CURO Research Assistant
Dr. Aaron Thompson, Crop & Soil Sciences, College of Agricultural & Environmental Sciences

In the future, iron isotope fractionation patterns can serve as tracers for redox conditions in past climates, particularly when coupled with fractionation patterns for other metal isotopes. Given that microbes play a role in iron reduction, these redox conditions might elucidate microbial composition in ancient soils. Hawaiian soils have undergone

controlled soil formation, or pedogenesis, as a result of their formation from volcanic hot spot activity. We sought to determine differences in the iron (Fe) isotopic ratio of 56Fe/54Fe in soils of varying age and climate from Hawaii. Our sampling sites varied in mean annual precipitation. We hypothesize that elevated weathering from increased precipitation and/or age of soils will yield a greater 56Fe/54Fe ratio. Samples were digested for Fe isotope analysis. For Fe purification, a double-spike of 58Fe-54Fe was added to each purified sample to account for mass bias in Inductively Coupled Plasma Mass Spectrometry (ICP-MS) measurements of 56Fe and 54Fe. Isotopic compositions will be compared across soils with temporal and spatial climate variation to elucidate redox patterns in the soils.

The Influence of Formal and Informal Sources of Support on Foster Parents' Couple and Co-parenting Relationship Quality

Avery Campbell, CURO Research Assistant
Dr. Ted Futris, Child & Family Development, College of Family & Consumer Sciences

Nearly 7,500 of Georgia's children are placed in foster care each year. Having had experience with maltreatment, poor parenting, and high-conflict homes, foster children benefit the most from foster homes that include both high-quality parenting and healthy couple relationships. However, foster parents experience many unique stressors (e.g., traumatic experiences of foster youth, challenges with both foster and birth children, financial strain, legal processes, increase on time demands, lack of permanency) that increase their risk of experiencing marital and co-parenting challenges, which may jeopardize placement quality and stability. Couples who have meaningful social connections they can turn to during challenging times typically do better managing their concerns. The current study examines the influence of formal and informal sources of support on married foster parents' couple and co-parenting relationship quality. From an initial pool of 4,346 active foster parents in Georgia shared by the Division of Family and Children Services, 2,465 were identified as married (62.4% Caucasian) and 300 couples were randomly selected and mailed a survey (50% Caucasian). A total of 100 foster parents responded (69.0% Caucasian; 59.0% female), representing a total of 60 married couples (63.3% with data from both partners). Preliminary results show that foster parents identified support from friends, their family or child's doctor, and other foster parents as most helpful. Additionally, foster parent support was associated with greater commitment to the couple relationship and higher relationship quality. This presentation will share the results of this study and implications for enhancing support services for foster parents across Georgia.

Geographic Distribution of Adult Body Mass in Muridae

Patric Campbell
Dr. John Gittleman, Odum School of Ecology

Geographic range size and body mass have been well studied in mammalian species. However, the studies overlook the fact that geographic distribution may correlate with body mass. We used various museum rodent specimens to estimate body mass using an allometric relationship between adult body mass and skull length. The reason we are using rodent specimens is that we have a lot of information on many rodent species; yet, we are still missing data from a few rodent species. In order to find out more information on their geographic distribution, we can use patterns of information that is analyzed to provide correlations to the data we are missing for the few rodent species. Using the location data for where each museum specimen was collected, we will analyze global

patterns of body mass across a map of biogeographic realms. The main goal in mind is to predict patterns of geographic distribution in rodent species to help aid with conservation measures, due to the fact that environmental changes are expected to alter geographic distribution and can put many of these species at risk for extinction.

Synthetic Estrogen Disrupts Spindle Organization and Meiotic Division in Oocytes

Madison Canning, CURO Research Assistant
Dr. Maria Viveiros, Physiology & Pharmacology, College of Veterinary Medicine

Aneuploidy, the presence of an abnormal chromosome number, in embryos is a leading cause of birth defects such as Down syndrome and pregnancy loss. This condition is primarily attributed to meiotic division errors in female oocytes before fertilization. Studies indicate that environmental toxins, such as estrogenic compounds, can disrupt oocyte development and meiosis. This investigation tested the effect of short-term exposure to the synthetic estrogen, Diethylstilbestrol (DES), on mouse oocytes in culture. To determine whether DES impairs the resumption and progression of meiotic division, GV-stage oocytes with surrounding granulosa cells were collected from pre-ovulatory follicles and cultured with increasing concentrations of DES (0, 5, 15 and 30 uM) for 17 h. Additionally, we tested whether a brief 4h exposure to DES disrupts mature MII oocytes post-ovulation. Following culture, the oocytes were fixed for immunofluorescence analysis of chromosome and meiotic spindle configurations. The distribution of key MTOC associated proteins, pericentrin and g-tubulin, was also analyzed. DES exposure during 17h culture disrupted the progression of meiosis, with higher concentrations of DES leading to MI-arrest. The oocytes showed significant chromosome-microtubule attachment errors as well as disrupted meiotic spindle organization. In addition, both pericentrin and g-tubulin showed atypical distribution in numerous smaller foci throughout the cytoplasm. Interestingly, similar errors were observed in ovulated MII eggs following short exposure to DES. These data indicate that DES exposure significantly disrupts oocyte microtubule organization, causing meiotic spindle structure defects and chromosome attachments errors. These deformities can result in aneuploidy, which adversely effects embryonic development post fertilization.

Corporate Social Responsibility and Stock Prices: The Environmental Responsibility of Shareholders

Katie Cannon, CURO Research Assistant
Dr. Christopher Pope, Banking & Finance, Terry College of Business

Over the past few decades, the American population has taken an increased interest in the environmental and social problems that directly result from corporate decisions. Multiple studies have found that consumers, investors, and financing organizations have become sensitive to corporate environmental responsibility, and especially their irresponsibility. Decision makers need dependable information to help them balance their responsibilities to the shareholders and to show the company as environmentally responsible. The objective of this study is to measure the impact that eco-friendly and eco-harmful events have on stock prices, as a measure of corporate performance. To examine the impact that sustainable initiatives (or lack thereof) have on stock prices in modern times, a series of event studies was performed. Relevant events between 2010 and 2015 were identified using Wall Street Journal articles, found through Factiva. Focusing on the environmental responsibility portion of CSR, appropriate events were determined using applicable

keywords. Each event was then categorized into one of two groupings: eco-friendly or eco-harmful. A three-day event window [-1,1] was used to observe any abnormal returns surrounding the events. Based on previous research, it is likely that this study will find a causative relationship between eco-harmful and eco-friendly events and a change in the company's stock price. Specifically, past studies have indicated that stock prices will rise after the announcement of an eco-friendly event, while stock prices will fall after the announcement of an eco-harmful event. The results of this study should give decision makers a clearer path to follow.

Investigating the Plasmonic Property of Ag-Cu Alloy Nanostructures

Daniel Carlson
Dr. Yiping Zhao, Physics & Astronomy, Franklin College of Arts & Sciences

When a photon hits the interface between a noble metal and a dielectric (such as air), it causes electrons to oscillate at that interface. When the size of the metal becomes much smaller than the wavelength of the incident light, at certain frequencies photons will excite a strongest oscillation, which is known as surface plasmon resonance (SPR). At the SPR frequency, the electric field around the metal surface will be greatly enhanced, which can be used in a wealth of applications such as food safety, medical diagnostics, microscopy beyond the diffraction limit, or even disease treatment. For different applications, it is very important to tune the SPR frequency. This project focuses on manipulating the SPR frequency using the silver-copper composite nanostructures. The Ag-Cu composite nanostructures are fabricated using shadow nanosphere lithography with a two-source electron beam deposition system. Glass substrates are coated with a hexagonal close-packed colloid monolayer of polystyrene beads (500 nm and 750 nm in diameter) and act as a mask during physical vapor deposition. By controlling the deposition rate of the two metals, their relative composition can be tuned. The resulting materials are characterized by UV-Vis spectrometer, scanning electron microscopy, transmission electron microscopy, atomic force microscopy, and energy dispersive x-ray spectroscopy. We find that the SPR frequency decreases with the Cu composition, which is consistent with the theoretical prediction. We will establish the relationship between the optical properties and the morphology and composition of the Ag-Cu nanostructures.

Pre-to-Post Transplantation Changes in Caregiver Emotional Functioning

Olivia Carlson
Emily Ivey, Colleen Keeler
Dr. Ronald Blount, Psychology, Franklin College of Arts & Sciences

Objective: Caregivers and families of children awaiting solid organ transplantation often experience significant stress. Less research has examined how caregiver and family distress changes from before to after transplantation. This study investigated how caregiver and family psychosocial functioning changed from before (T1) to 6 months after transplantation (T2). It was hypothesized that caregiver and family distress would decrease from T1 to T2. *Methods*: The sample included 46 caregivers of pediatric transplant recipients (T1 *M* child age = 8.08 years; T2 *M* child age = 9.11 years). T1 data was collected at the pre-transplant evaluation and T2 data was collected 6 months post-transplantation. Caregivers completed questionnaires of their own emotional functioning and the impact of the child's illness on the family. *Results*: From T1 to T2 (*M* time passed = 11.92 months), caregivers demonstrated significant decreases in somatization symptoms ($d = .31$, $p = .04$), overall emotional distress ($d = .40$, $p = .02$), and post-traumatic stress symptoms ($d = .45$, $p = .01$). There were no differences from T1 to T2 for caregiver depression, anxiety, or the

impact of the child's illness on the family. *Conclusions*: Symptoms likely decreased in response to having the burden of awaiting transplantation removed. Anxiety and depression symptoms and the impact of the child's illness on the family may require intervention to decrease post-transplant. Providers may inform caregivers that aspects of emotional distress will likely decrease post-transplantation, and provide support for current symptoms. *Significance*: Results inform evidence-based practices for the content of psychoeducation provided to families before transplantation.

Effects of Maternal Immune Stimulation by a Viral Mimic on Autistic and Other Behaviors of Juvenile and Adult Mouse Offspring

Annika Carter, CURO Summer Fellow
Dr. Nick Filipov, Physiology & Pharmacology, College of Veterinary Medicine

In line with epidemiological data, maternal immune stimulation of mice leads to neurobehavioral deficits of autistic nature in the offspring. While other studies focused on the effects of maternal immune activation (MIA) early in development predominantly on male offspring, this study investigated the degree and nature of behavioral deficits caused by MIA in juvenile (postnatal day [PND] 35) and adult (PND70) offspring of both sexes. A viral mimic, Poly I:C, was administered at mid-gestation to dams. Offspring were left unperturbed until behavioral testing. Male and female offspring were subjected to behavioral tests at PND35 or PND 70 designed to detect motor, emotional and cognitive behavioral deficits, including some of autistic nature. From data analyzed thus far, sex differences are apparent: the juvenile females swam longer and climbed more in the forced swim test, and both juvenile and adult females had decreased grip strength compared to age-matched males in a grip strength test. In the marble-burying test, a measure of anxiety, there was a trend for increased marble burying by juvenile male offspring of dams treated with Poly I:C; this trend was significant at PND70. These results indicate that male and female mice, while performing differently in tests for depression and muscle strength, are not affected by MIA in these two domains. Alternatively, male mice born to MIA dams exhibit increased anxiety, which is more pronounced in adult offspring. These data suggest that key autistic behaviors in offspring of MIA dams are maintained in adulthood and have a male bias, similar to children with autism.

***In Vitro* DNA-Protein Interaction Analyses of *Zea mays* Transcription Factors**

Kitra Cates, CURO Research Assistant
Dr. Robert Schmitz, Genetics, Franklin College of Arts & Sciences

Corn (*Zea mays*) serves as an integral world crop used for oil production, livestock feed, and nutrient sources in the human diet. Corn is a cereal crop grown for the palatable grains it produces, which are primarily composed of endosperm. Research concerning regulatory pathways associated with transcription in endosperm is necessary to study the factors involved in early seed development and the regulatory influences on hypomethylation observed in corn endosperm. In addition, this study serves to develop a novel *in vitro* DNA-protein interaction protocol. Transcription factors PBF-1, Opaque2, abi3/ZmAFL4, OHP1, and OHP2 were chosen due to their activity during endosperm development. Each transcription factor gene was artificially synthesized in a Gateway entry vector plasmid and transformed into *Escherichia coli*. Sequential cloning into the destination vector pIX-HALO added a HALO motif sequence to the gene sequences and placed the genes under an inducible promoter. Cloned genes were expressed and translated using an

established *in vitro* protocol. HALO hybrid proteins were utilized to isolate DNA targets of our transcription factors. Purification with an anti-HALO antibody coupled with high throughput sequencing identified the targets of our transcription factors, providing novel data on the role of these transcription factors in regulation of endosperm development**.** The protocol parallels the widely used, but extremely costly, chromatin immunoprecipitation sequencing protocol. It provides an efficient, scalable production of transcription factors and the potential to manipulate regulatory networks of interest.

Possibility of Attitude Change towards Edible Insects When Prepared by Top Chefs

Gillian Caudill
Dr. Marianne Shockley, Entomology, College of Agricultural & Environmental Sciences

In 2012, a previous student studied attitudes and behaviors of individuals before and after eating an insect infused product. The student wanted to determine if choice was based upon attitudes towards their health. Since their findings showed that focusing on health has little impact on changing attitudes, it would be beneficial to study a change in attitude based on appearance of the food. Instead of promoting insects as a healthy choice, we chose to promote insects as an exotic and aesthetic food chefs can prepare at an event this past September of 2015 at the Science Cafe Bug Banquet. This event featured renowned chefs from various restaurants in Athens, GA. We predicted that there will be a more dramatic change in attitudes based upon appealing to people's desire to eat a food that is exotic, mostly unavailable in the States, and that is made by acclaimed chefs.

University Professors with Disabilities

Maria Ceron, CURO Honors Scholar
Dr. Edward Delgado-Romero, Counseling & Human Development Services, College of Education

This project presents preliminary results on the first phase of a qualitative study focused on exploring and comprehending the concept of "inclusive" higher education. The analyzed sample consists of six university professors of education from Bogota, Colombia who have lived almost their entire lives experiencing some form of disability. These professors have lived with a disability during the vital period of adolescence, professional training and development, and today serve as trainers in higher education in various subject areas. This project takes into account the fact that people with disabilities are increasingly able to participate in social processes, and are therefore able to contribute to the construction of an inclusive society for all. The study was conducted in three phases. First, each professor's teaching style was illustrated through video recordings of his/her class. The videos were then analyzed according to an established protocol. Then, instrument inventories were utilized to analyze the effectiveness of each professor's teaching style. Finally, in-depth interviews were conducted, transcribed verbatim, and analyzed in order to understand participants' construction of meaning in terms of the relationship between disability, experience, and teaching. Ultimately, the purpose of this study is to determine the effects in which people with disabilities in professional positions influence society. As professors, they hold positions of influence over students in education who will be responsible for implementing the concept of inclusivity into their own classrooms in the future, thereby aiding to the construction of an inclusive society for all.

Novel Nitric Oxide Releasing Materials for Prevention of Infection in Vascular Catheters

Sarah Chaji
Dr. Hitesh Handa, College of Engineering

Clotting and infection are two common problems associated with vascular catheters. Catheters are used in hospitals in thousands of patients every day and are highly prone to infection. The proteins in blood plasma such a fibrinogen and albumin attach to the catheters allowing bacteria to bind to the catheter surface leading to biofilm formation and infection. Frequent use of antibiotics has shown to create resistant strains of bacteria, increasing the risk of infection, thus making them an expensive approach for hospitals due to longer duration of infection recovery time. Nitric oxide (NO) is known to be a potent antibacterial and anti-thrombotic agent. Endothelial cells that line the inner walls of all blood vessels exhibit a NO flux of 0.5–4 × 10−10 mol cm−2 min−1 that helps prevent thrombosis. This research examines the potential of incorporating NO donor, SNAP (*S*-nitroso-*N*-acetylpenicillamine) within Elast-eon E2As catheters (medical grade polymer). This research study consists of a bacterial adhesion assay on protein-exposed catheters made of SNAP and E2As against gram positive and negative bacteria. The results suggest that the SNAP/E2As catheters have the potential to improve the bactericidal activity of intravascular catheters, as well as other blood-contacting medical devices (e.g., vascular grafts, stents).

The Role of Cas4-2 in the CRISPR Adaptation Stage of *Pyroccocus furiosus*

Chip Chambers, CURO Honors Scholar
Dr. Michael Terns, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats) Cas (CRISPR-Associated) proteins are revolutionizing the field of modern biology, research, and medicine. With most research occuring within the last 5-10 years, CRISPR is rapidly becoming one of the most hot-button issues in biology, prompting coverage from the New York Times, Wall Street Journal, and NPR. CRISPR-Cas is an adaptive immune system in prokaryotic systems made up of several "Cas" (CRISPR-Associated) proteins. My research focuses on evaluating the role of one protein, Cas 4-2, in the CRISPR system of *Pyroccocus furiosus*. This protein has been implicated in the adaptation stage of CRISPR, possibly associating with Cas 1 and Cas 2, which are known to form complexes in the adaptation phase of the process. This presentation will appeal to a broad audience with an introduction to CRISPR while simultaneously conveying the technical aspects of the research.

Can Virtual Reality Lead Us to Learn More about Empathy?

Bleak Chandler, CURO Research Assistant
Dr. Sun Joo Ahn, Grady College of Journalism & Mass Communication

Can virtual reality lead us to learn more about empathy? The dark triad is a group composed of three personality traits: psychopathy, Machiavellianism, and narcissism. With the use of Samsung Gear VR virtual reality, we want to discover whether or not we can discover a link between the dark triad and an individual's empathic response. Each study will involve two individuals who will enter a room. Before entering, Individual A will take a test that determines their "dark triad" personality. Individual A will then enter the room and be set up with a virtual reality headset. Individual B, a confederate, will be set up with a device that can "measure" their heart palpitations. Individual A will read a prompt from a script to individual B that will "trigger" their heart rate. Individual A will then, using the virtual headset, "walk" inside a 3D virtual representation of individual B's heart and experience their heartbeat and palpitations; this heartbeat is simulated. A test will be given after to Individual A to help

determine a link between the dark triad and empathy. Through this test, we want to discover whether or not Individual A's responses and reactions to Individual B's simulated heartbeat are connected to their dark triad.

Corporate Environmental Responsibility Recognition and Firm Value

Mary Chastain
Dr. Christopher Pope, Banking & Finance, Terry College of Business

This paper investigates the relationship between corporate environmental responsibility recognition and firm value. The purpose of the paper is to answer the following question: does external acknowledgement of a firm's sustainability position affect firm value? Answering this question could provide empirical data encouraging companies to adopt sustainable initiatives. The Corporate Knights' "Global 100 Most Sustainable Corporations" is the acknowledgement considered in this study. A firm's placement on, removal from, or new ranking are evaluated to capture any impact of recognition on firm value. The study might be limited by the importance in which the accolade holds. Results pending.

Post Translational Modifications of CaaX-Box Proteins Are Dependent on Specific CaaX Motifs

Michael Cheng, CURO Graduation Distinction
Dr. Walter Schmidt, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

The modifications occurring to *CaaX* proteins have largely been established using few reporter molecules (e.g. Ras, the yeast a-factor mating pheromone). These proteins undergo three coordinated COOH-terminal modifications: isoprenylation of the motif's cysteine, proteolysis to remove the *aaX* portion, and carboxylmethylation of the COOH-terminus. Here, we investigated the coupling of all three modifications in the context of the yeast Ydj1p Hsp40 chaperone. We provide genetic, biochemical, and biophysical evidence that the Ydj1p *CaaX* motif is isoprenylated but not cleaved and carboxylmethylated. Moreover, we demonstrate that Ydj1p-dependent phenotypes and Ydj1p localization are altered when *CaaX* motifs from yeast Ste18p or a-factor are transplanted onto Ydj1p. The abnormal phenotypes and localization patterns revert to normal when post-isoprenylation events are genetically interrupted. Our findings promote a general model in which proper Ydj1p function and localization require an isoprenylatable *CaaX* motif that is resistant to post-isoprenylation events. These results expand on the complexity of protein isoprenylation and revise the impact of post-isoprenylation events in regulating the function of Ydj1p and perhaps other *CaaX* proteins.

Yohimbine-Induced Reinstatement in Alcohol-Preferring and Wistar Rats

Scott Chimberoff, CURO Research Assistant
Dr. Jesse Schank, Physiology & Pharmacology, College of Veterinary Medicine

Animal models are frequently utilized to develop treatments for a variety of human medical disorders and have been developed to assess critical adaptations within the brain involved in the development of tolerance to, and physical dependence on, alcohol. To better understand the 50% genetic component to the risk for developing alcoholism, alcohol-preferring (P) rats have been selected for high alcohol preference and bidirectionally bred from outbred Wistar rats. Many studies have shown that P rats will self-administer more alcohol than Wistar rats; however, few have studied relapse-like behavior using the reinstatement model. One study demonstrated

that P rats will reinstate, or relapse, to alcohol-seeking behavior after being injected with the pharmacological stressor yohimbine. However, the P rat's sensitivity to yohimbine was not measured using a dose-response analysis. In this study, we explored yohimbine-induced alcohol seeking using the reinstatement model and neuronal activation in the nucleus accumbens shell, a region involved in drug-reward and positive reinforcement, using immunohistochemistry between P and Wistar rats. Neuronal activation was investigated by staining for the Fos protein, whose presence is indicative of neuronal activation. Consistent with previous studies, we found P rats will self-administer more alcohol than Wistar rats. We also found P rats to have greater sensitivity to the reinstatement effects of yohimbine and show greater neuronal activation in the nucleus accumbens shell. This study is one of few addressing relapse-like behavior using the reinstatement model, and possibly the first to compare the reinstatement effects of different doses of yohimbine between P and Wistar rats.

Analysis of the Relationship between Patient Satisfaction Scores and Patient Health Outcomes

Taylor Chishom, CURO Honors Scholar, CURO Graduation Distinction, CURO Research Assistant
Dr. Amanda Abraham, Health Policy & Management, College of Public Health

The Centers for Medicaid and Medicare Services (CMS) now requires hospitals to report and submit their patient satisfaction ratings, which are known as Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) scores. These patient satisfaction scores are tied to a portion of the hospital's reimbursement as a part of CMS's new value-based purchasing initiative. The scores are also published on CMS's hospital compare website, and consumers are able to compare hospitals based on the hospital's HCAHPS scores. Consumers can also compare hospitals based on outcomes such as value of care, timeliness of care, and readmission rates. The purpose of CMS's hospital compare website and value-based purchasing initiative are to incentivize hospital providers to increase the quality of their services while also reducing costs. The purpose of this analysis is to determine if CMS's use of HCAHPS scores in determining a portion of the hospital's reimbursement is tied to better healthcare service quality and better patient health outcomes, or if hospitals are simply investing in processes and environments that result in better HCAHPS scores but not necessarily better healthcare service quality or better patient health outcomes. The hospitals being studied in this analysis are Athens Regional Medical Center and St. Mary's Hospital, which are located in Athens, Georgia. Using these hospitals' patient satisfaction scores, general patient readmission rates, and hospital deaths among patients with treatable complications, a determination will be made as to whether higher HCAHPS scores are linked to better patient outcomes and improved healthcare quality.

Addressing Teenage Pregnancy in Athens-Clarke County, Georgia

Hailey Clark
Dr. W. David Bradford, Public Administration & Policy, School of Public & International Affairs

Since reaching an all-time high in 1990, the teenage pregnancy rate in the United States has steadily decreased. This is in large part due to public health programs designed to increase access to preventative care and to decrease risky sexual behavior. Nevertheless, Athens-Clarke County has a teenage pregnancy rate of 59 pregnancies per 1,000 teenage females, which is higher relative to Georgia (41.3) and the United States (34).

Teen pregnancy has consequences for both teenage parents and the children of teenage parents in terms of educational, employment, and financial outcomes. These consequences are passed on to all citizens in the forms of decreased social well-being and fiscal costs to fund support programs. A systematic review of three policy alternatives and the status quo was conducted on the basis of economic viability, medical effectiveness, and political feasibility. Based on the results of a policy matrix, Athens-Clarke County officials should implement an educational program in the local high schools that promotes youth development in addition to providing sexual education, rather than accept such consequences and allow the teenage birth rate to decrease gradually. Increased connection to one's community and preparation for future aspirations lessens the incidence of risky sexual behavior and resulting pregnancy. Further investigation into the public sentiment of Athens-Clarke County citizens and the Clarke County School District's ability to administer the program is necessary going forward.

Effects of Fire in a Riparian Zone on Aquatic Fungi

Sarah Clement, CURO Research Assistant
Dr. Amy Rosemond, Odum School of Ecology

Fires are an important structuring element of forest ecosystems, both naturally occurring and those used for forest management, and can vary in their severity and impact. Nutrient release in the form of nitrogen is one of the known short-term effects of forest fires, both in terrestrial and aquatic ecosystems. Stream nutrient enrichment studies have been shown to cause an increase in aquatic fungal reproductive output, in the form of conidia production, as well as an increase in aquatic fungal abundance and species richness. There are few studies on the effects of fire on stream fungi. This study aims to test if nutrient release from fires causes a similar effect on stream fungi as artificial nutrient enrichment. By comparing a severe burn and a mild burn, this study will provide evidence as to how these effects could change with global climate change, as severity and prevalence of fires increases. I predict that increased nutrients will cause an increase in fungal biomass, production, and conidia production. I predict the increase in conidia production to be more drastic than the increase in biomass, as more production will be devoted to reproduction. I predict there will be a shift in fungal species richness and relative species abundance. I predict the magnitude of these changes to be greater for the severe burn. I will measure fungal biomass via ergosterol extraction, and conidia will be stained in water samples, counted, and identified. Biomass versus reproductive output will be compared pre-burn and post-burn.

The Effects of Lutein and Zeaxanthin Supplementation on Sensory Function in Healthy Adults

Harrison Cloud
Dr. Lisa Renzi, Psychology, Franklin College of Arts & Sciences

Xanthophyll catotenoids lutein (L) and zeaxanthin (Z) are the only carotenoids found in the neural retina and are the dominant caotenoids in the brain. Previous research has shown that supplementation with L+Z can improve visual function under conditions that cause light stress. These effects are largely optical in nature, but additional past research has shown that L+Z may also improve visual function via improving processing speed of visual stimuli in younger adults. The purpose of this study was to determine whether or not supplementation can improve visual processing in older adults. A total of 51 adults over the age of 65 (M = 73.74 +/- 8.2 years) completed a one-year randomized, double-masked, placebo controlled L+Z supplementation study. In addition to a

number of basic cognitive measures, temporal visual processing speeds, visual reaction time and coincidence anticipation ability were tested at baseline, 4-month, 8-month and 12-month time points. Temporal visual processing speed was measured via a custom-built desktop optical device, and visual reaction time was measured using a wall-mounted, custom-built Beyseian timer. In addition to visual function testing, other markers of visual health, such as incidence of age-related cataract, smoking status, and dietary intakes, were collected. Preliminary analyses suggest that nutritional supplementation with L+Z improved visual reaction time in older adults. Analyses are ongoing, but preliminary results suggest that L+Z can improve visual function via both optical (as shown previously) and neural mechanisms.

Natural Killer Cell Maturation is Controlled by Genetic Background in Aging Mice

Erica Coe
Dr. Robert Pazdro, Foods & Nutrition, College of Family & Consumer Sciences

Natural killer (NK) cells are a key component of innate immune responses. Using granules containing perforin and granzymes, NK cells destroy cancerous and virus-infected cells within the body. Recent studies show that as organisms age, NK cell maturation becomes dysfunctional. NK cells increasingly arrest in the early stages of development and fail to become fully mature. These defects ultimately increase susceptibility to cancer and viral infections later in life. We predicted that age-associated declines in mature NK cells are heritable. To test our hypothesis, we assessed the development of splenic NK cells isolated from old mice representing 19 genetically-diverse inbred strains. We measured the number of NK cells as a percent of total splenocytes, and we quantified the percentage of NK cells in each of the following stages: mature, transitional, immature, and double negative. Our results show that NK cell maturity is highly heritable in old mice. Our future studies will identify novel genes and pathways that drive NK maturation during aging, and we predict that these pathways will serve as targets for innovative cancer therapies.

Polysialic Acid Expression in AICAR Treated Mouse Neuroblastoma Cells

Elyssa Cohen
Dr. Michael Tiemeyer, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Polysialic acid (PSA) is an N-linked glycan decoration found on the Neural Cell Adhesion Molecule (NCAM), which is expressed in Neuro-2A cells, a mouse neuroblastoma cell line. AICAR is a pharmacological activator of AMP-activated protein kinase (AMPK) - mammamlian target of rapamycin (mTOR) signal transduction pathway. AICAR activates AMPK, leading to increased phosphorylation of TSC2, which produces GDP-bound Rheb. GDP-Rheb inhibits mTORC1 activity, and mTORC1 inhibition causes tumor suppression. Therefore, mTORC1 inhibition is currently of great interest as a clinical approach for cancer treatment. Insight into how AICAR might affect glycosylation could lead to an understanding of the roles that specific glycans, such as PSA, might play in the AMPK-mTORC1 pathway. In the Neuro-2A cell line, I hypothesized that treatment with AICAR would increase PSA expression, thereby implicating a novel role for mTOR signaling in the regulation of glycoprotein glycosylation. My experimental results demonstrate that treatment of Neuro-2A cells with 500μM AICAR for twenty-four hours induces cells to increase PSA expression. Western blot analysis demonstrates that the amount of NCAM protein does not change in treated Neuro-2As. Rather, AICAR affects the

glycosylation of NCAM. Furthermore, by lectin blot analysis, AICAR does not appear to impact the ability of Neuro-2A cells to glycosylate proteins; the expression of high-mannose glycans indicates that core N-glycosylation levels are not altered. Thus, alterations of AMPK-mTORC1 signaling affects processing of glycoproteins in neuronal tumor cell lines, suggesting dynamic modulatory mechanisms for regulating cell-surface glycan expression.

Use of a Spatial T-Maze Test and an Object Recognition Test to Assess Learning and Memory in a Piglet Model

Caroline Coleman, Foundation Fellow
Dr. Franklin West, Animal & Dairy Science, College of Agricultural & Environmental Sciences

Due to similarities between piglet and human toddler brains in structure, composition, and development, piglets have become increasingly relevant subjects in varying aspects of cognition in a piglet model. The spatial T-maze test assesses learning and spatial memories, and the object recognition test assesses object memory. In the spatial T-maze test, piglets will learn to locate a milk reward within a plus-shaped maze. This will test allocentric memory as piglets will have to use extra-visual cues to locate the milk reward, despite starting at alternating north and south start arms. We will measure latency to choice and proportion of trials correct. We expect that piglets will acquire the ability to use extra-visual cues to locate the milk reward, demonstrated by decreased latency to choice and increased proportion trials correct. In the object recognition test, piglets will be exposed to two similar objects, wait for a ten-minute interphase interval, and then be exposed to one familiar and one novel object. Time spent interacting with each of the objects will be measured, and memory involved in distinguishing between familiar and novel objects will be tested. We expect that piglets will spend more time with the novel object over the familiar object. Together with the social recognition test and the open field test, these two behavioral tests will contribute to further understanding piglet learning, memory, and overall cognitive abilities.

The Gendered Risorgimento: How Wealthy British Ladies Ended Up Campaigning for Italian Unification

Zoe Condon
Prof. Steven Soper, History, Franklin College of Arts & Sciences

This project analyzes the varied political involvement of aristocratic British women in Italian unification efforts during the Victorian reformist era. The goal is to show that women did not simply hold back from the political arena, but they were, for the most part, not on the front line of debate either. Instead, women had a variety of political experiences in their efforts with the Italian campaign, spanning from pamphlet writing and public speaking endeavors to more traditional concepts of female political participation like hosting charitable events. The research was done by examining and analyzing letters and correspondence between wealthy women and members of liberal pro-unification entities, which demonstrate women played a major role in publicizing and contributing to the British efforts in the Risorgimento. This paper argues that British women played a critical role in political reform campaigns.

The Effect of Shield Laws on Journalists Acting as Investigators, Specifically at Public Universities

Aaron Conley, CURO Honors Scholar, CURO Summer Fellow
Dr. Barry Hollander, Grady College of Journalism & Mass Communication

In recent years, there has been much debate about the right of journalists to refuse to testify as to the identity of confidential

sources or confidential information collected in the process of newsgathering. Recently, this protection has been brought into the attention of the general public as the result of the case surrounding James Holmes, the now-convicted shooter from the movie theatre in Aurora, Colorado. In the course of the investigation and trial, a copy of Holmes' diary was leaked to Fox News reporter Jana Winter, who published its contents. The State of Colorado attempted to force Winter to reveal the source who leaked the diary, but the courts ruled that Winter was protected by New York's state shield law. One major question that has been prevalent in the debate over shield laws centers on who specifically is protected by these statutes, especially in the case of student journalists. While the United States Supreme Court addressed many questions about the rights of high school student journalists in its decision for *Hazelwood School District v. Kuhlmeier*, there has been no effort to address the rights and protections that should be afforded to journalists at public universities. By examining the various state shield statutes that have already been established, the proposed Free Flow of Information Act of 2013, as well as other academic sources and court precedents, it can be seen that in many cases collegiate journalists are not afforded the protection under the law that they should rightfully receive.

Fracking Governance and Resistance in Western North Carolina

Julia Connell, CURO Research Assistant
Elizabeth Wilkes
Dr. Jennifer Rice, Geography, Franklin College of Arts & Sciences

Hydraulic fracturing (fracking) is largely unregulated at the federal level and is exempt from nearly all federal environmental laws, leaving individual states and localities to regulate the industry. This fragmented landscape of regulatory responsibility has resulted in limited spaces to contest whether or not fracking should be permitted. Our research attempts to determine the spaces and practices of opposition that are possible under neoliberal forms of fracking governance. Using theoretical insights on the nature of democracy, we examine an anti-fracking movement in western North Carolina, one of the only such movements in the United States to coalesce before drilling had started. We argue that contemporary forms of democracy under neoliberalism limit resistance and activism to what we call "micro sites" of contestation. These include: letters to the editors in local newspapers; landowner rights workshops on fracking; local government resolutions against fracking; and the Mining and Energy Commission (MEC) hearing on the rules that permit hydraulic fracturing. This research contributes literature on state theory and environmental governance by showing the ways in which resistance is focused into narrow spaces of dissent under neoliberal governance.

Psycho-Social Impact of Drone Strikes on Non-Combatant Populations: The Cognitive Mechanism Underlying Pro-Group Endorsement of Extremist Violence

Laura Courchesne, Foundation Fellow
Dr. Jeff Berejikian, International Affairs, School of Public & International Affairs

This research examines the impact of drone strikes in influencing the perceptions and decision-making processes of civilian populations. It presents a critique of the traditional view that drones help protect soldiers by reducing the need for on-the-ground action in a conflict. By contrast, it contends that drones help produce a communal identity as well as a preference towards group ideology and extremism among previously non-militant actors. This argument relies on a neurological, psychological, and anthropological understanding of trauma and

anxiety, modeled around the theory of modes of religiosity, to illustrate the potential harm drone strikes can have in aiding militant recruitment efforts. As a result of the trauma they create, drone strikes are able to alter the behavior of population members, who might not normally endorse or join a violent organization, towards pro-group behavior. This can take the form of a shift in moral values and/or the promotion of extreme actions in protection of the group. The emotional response drones elicit and the subsequent psychological changes which occur lead to improved recruitment and support of militant efforts. To support this causal relationship, the paper will present a cognitive mechanism, based on the trauma's successive influence on mental functioning, sense of group identity, and capacity for moral decision-making. This research utilizes case studies on collective experiences of violence and trauma, including disasters, terrorist attacks, religious rituals, and gang initiations, to illustrate the explanatory power of this mechanism.

The Psychology of Nazism and Genocide: The Role of Religion and Symbolism
Laura Courchesne, Foundation Fellow
Dr. David Williams, Religion, Franklin College of Arts & Sciences

The Holocaust is a widely studied historical example of the consequences of uninhibited intergroup aggression and explicit targeting of a particular community on the basis of a shared characteristic. This research provides a review of relevant literature examining the Holocaust as a case study in understanding the psychological, economic, cultural, and religious factors which contribute to group aggression. It places particular emphasis on what leads an individual to accept the violent and discriminatory ideologies of a group, with an interest in applying a psychological understanding of in-group/out-group biases as well as investigating the role of religion and ideology in fostering pro-group sentiments. It offers an understanding of the factors which instigate intergroup violence and genocide as well as the psychology of individuals involved in genocides. This research explicitly focuses on how religion and cultural mythology within German society acted as a structure which inspired the promotional and ideological tactics of the Nazi party in promoting antisemitism. It provides an overview of the theoretical basis of ethnic conflict and genocide while highlighting the importance of evoking certain emotions in a populace through the use of symbolism, mythos, and religion.

Optimizing Plique-à-Jour Enameling
Melissa Cousins, Ramsey Scholar, CURO Summer Fellow
Prof. Mary Pearse, Lamar Dodd School of Art

My research examines the current methods of plique-à-jour enameling and looks at what is actually beneficial to the final piece of enamel. The modern techniques for many styles of enameling are counterintuitive and contradictory, and the long-winded process and delicacy required by these methods tends to turn people away from this style of enamel. I am looking at each step of the process and determining which are helpful, which do nothing, and which are detrimental. My hopes are to come up with a more streamlined method of plique-à-jour to make it more accessible and less difficult to produce. The methods I am using include visual comparisons between samples made using washed, sifted, washed and sifted, and unwashed and unsifted enamels; experimenting with different firing temperatures, firing times, and framework constructions; trying out mosaic work, mica inclusions, and painting for creating shading or pattern; testing if wet firing produces subpar results in comparison to dry firing; and figuring out the maximum size of a cell when using the surface-tension technique for

making a piece of plique-à-jour. All tests are done with unleaded enamels and do not necessarily reflect the properties of leaded enamel. My results have shown that unwashed, sifted enamel works best; a gradual increase in firing times will produce good results without harming a soldered framework; wet firing works just as well as dry and saves time. Tests on pattern making and cell size are still being conducted.

Heterologous Expression of Carbohydrate Utilization Genes from *Acidothermus cellulolyticus* in *Caldicellulosiruptor bescii*

David Cowan, CURO Graduation Distinction
Dr. Janet Westpheling, Genetics, Franklin College of Arts & Sciences

Current energy sources are unsustainable in the long term as well as being very detrimental to the environment; therefore, our future energy production will need to be both sustainable for the long term as well as being environmentally friendly. Lignocellulosic biomass including corn stover, sugar cane, wood, straw, and waste residues from agriculture and forestry is a promising resource for producing fuels and chemicals. Dr. Jan Westpheling's lab has introduced two xylanases (Acel_0180 and Acel_0372) from *Acidothermus cellulolyticus* into *Caldicellulosiruptor bescii*'s secretome in order to increase the species' ability to degrade plant biomass, particularly xylan. The effects of these introductions were determined by comparing growth on cellobiose and xylan substrates, and conducting xylanase activity assay. The results from these experiments showed a modest increase in the activity of the secretome but a dramatic increase in growth on xylan. The most striking result was the viable cell numbers obtained when growing cells on complex xylan substrates. *C. bescii* strains overexpressing Acel_0180 or Acel_0372 xylanases were viable after 36 h cultivation on oat spelts xylan, while neither control strain could. In addition, both strains with xylanase exhibited 32.7 and 15.5 folds higher viable cell numbers on birchwood xylan than that of the control strain. These results show an important step in biofuel research, as cells from the end of one batch are used as inoculum for the next batch to reduce cost and also xylose is one of the most abundant sugars in lignocellulosic biomass.

The Effects of Serum Dietary Carotenoid Levels on Cognitive Function in Healthy Adults

David Cromer, CURO Research Assistant
Eli Chlan
Dr. Lisa Renzi, Psychology, Franklin College of Arts & Sciences

Past research suggests that dietary carotenoids such as lutein (L) and its isomer zeaxanthin (Z) are capable of improving cognitive function in a wide variety of participants across the lifespan (e.g. Renzi et al, 2013). L and Z are known antioxidants that have been cited previously for their ability to reduce risk for central nervous system (CNS) degenerative diseases such as age-related macular degeneration (e.g. AREDS-2 Research Group, 2013), which has been linked to other CNS diseases, such as Alzheimer's disease (e.g., Sivak, 2013). These carotenoids are not the only carotenoids that cross the blood-brain barrier, nor are they the only antioxidants frequently consumed in the human diet. Whether or not these other carotenoids are as impactful as L and Z in cognitive function is currently unknown. The purpose of this thesis is to relate serum concentrations of alpha-tocopherol, retinol, beta-cryptoxanthin, and alpha-carotene to cognitive function in adults between ages of 18-90 years. Cognitive function was measured through a computerized cognitive inventory that includes measures such as processing speed, cognitive flexibilty, and other related factors. In order to measure serum carotenoids, 5 mm of whole blood was collected via venipuncture. Serum was

separated via centrifugation and was frozen at -80-deg C until it could be analzed via high-performance liquid chromatography (HPLC). Analysis is currently ongoing, and final results will be presented at the symposium.

The Role of Flagellar Motility in *Pseudomonas aeruginosa*-induced NET Formation

Christian Cullen
Dr. Balazs Rada, Infectious Diseases, College of Veterinary Medicine

Cystic fibrosis (CF) is a disease caused by a mutation in the cystic fibrosis transmembrane conductance regulator (CFTR) anion channel, resulting in severely impaired mucociliary clearance in the airways leading to chronic bacterial infections. *Pseudomonas aeruginosa* is the main CF respiratory pathogen responsible for large-scale neutrophil recruitment in the airways. Neutrophils fail to clear *P. aeruginosa*. Instead, they release granule cargo and DNA into the airway lumen causing tissue damage. The mechanism of neutrophil dysfunction in CF airways is unknown and of high clinical relevance. Neutrophil extracellular traps (NETs) represent a novel antibacterial mechanism of neutrophils when they release DNA associated with histones and granule components. *P. aeruginosa*-induced NET formation occurs in CF airways and offers a likely mechanism for neutrophil-mediated lung damage. Therefore, understanding its details is of potential clinical relevance for CF. Previously we had shown that bacterial flagellum is essential to induce maximal NET release in neutrophils. Recently, we found that bacteria with motile flagellum trigger significantly more NET release than *P. aeruginosa* with immotile flagella. To reveal the mechanism of this unexpected finding, we measured *P. aeruginosa* phagocytosis by neutrophils and found that immotile bacteria are not getting phagocytosed as efficiently as their motile counterparts. From our work, we propose that bacterial motility is the primary virulence determinant responsible for triggering NET formation by enabling *P. aeruginosa* and neutrophil encounters. Our work adds to current literature by distinguishing bacterial motility from the presence of flagellin protein, and proposes to target proteins driving flagellar motility as CF therapeutics.

Lesbian, Gay, and Bisexual Employment Protection: An LGB-Inclusive Argument for Title VII Sex Discrimination

Bryson Culver, CURO Honors Scholar
Prof. Alex Reed, Insurance, Legal Studies, and Real Estate, Terry College of Business

The 1964 Civil Rights Act provided various protections for millions of Americans based on their race, color, national origin, religion, and sex. In Title VII of the act, this action takes the form of employment protection. While the language of the legislation is very short and simple, the application of the law has grown to cover a wide range of sex-related aspects. As our understanding of sex and gender grow, so does the protection provided to it. Since 1989, this law has been interpreted to include protection against the many aspects of sex beyond a simple gender difference. Initially, the Supreme Court decision Price Waterhouse v. Hopkins added protection against the stereotypes employers may have about sex. A decade later, another Supreme Court decision protected against sexual harassment from someone of the same gender. These two ideas laid a foundation so that other atypical gender expressions could be protected. Transgenders, lesbians, gays, and bisexuals have had success in Federal Appellate and District courts by claiming their non-conforming sexual orientation should be protected under Title VII. In 2015, the Equal Employment Opportunity Commission endorsed these expanded uses of Title VII in its investigations into employment conduct.

Abstracts

The Genetic Network of Circadian Rhythms in *Neurospora crassa*

Sarah Cunningham, CURO Graduation Distinction
Dr. Jonathan Arnold, Genetics, Franklin College of Arts & Sciences

Many genes of *Neurospora crassa* are under the control of the biological clock in the cell. The clock consists of a closed network loop of the genes, *white collar-1 (wc-1)*, *white collar-2 (wc-2)*, *frequency (frq)*, and *clock controlled genes (ccg)* and their RNA and protein products. A model has been proposed for the network regulating these interactions that improves upon published models by differentiating between reactions in the cytoplasm and nucleus of the cell. Markov Chain Monte Carlo runs were used to test theseis models with published RNA and protein accumulation data and refine the model's parameters. The model ensemble created was found to fit experimental data collected from *Neurospora* statistically similarly to previously published models. This model was also expanded upon to include genes regulating the clock's ability to entrain to light and tested against other light entrainment models. A better model could improve research done on all areas of the clock and further our understanding of circadian rhythms in *Neurospora* and all other organisms with a circadian clock.

Pharmacological Inhibitors of Epigenetic Mechanisms Alter Liposome Uptake

Isha Dabke, CURO Research Assistant
Dr. Brian Cummings, Pharmaceutical & Biomedical Sciences, College of Pharmacy

In recent years, there have been rapid advances in the understanding of epigenetic mechanisms, which include histone modifications and DNA methylation. These mechanisms, in addition to other transcriptional regulatory events, ultimately affect gene activity and phenotypic expression without physically altering the nucleotide sequence of the DNA itself. Similarly, the potential of liposomes as drug deliverer devices has also gained significant attention in the scientific sphere. Liposomes are amphipathic molecules and have proven to show an improvement in the therapeutic index of new or established drugs by modifying drug absorption, reducing metabolism, prolonging their own biological half-life, and reducing unwanted side-toxicity. The goal of this study is to determine the effects of epigenetic drugs (DNA methylation inhibitor *5-aza-2'-deoxycitidine* and histone deacetylation inhibitor *Trichostatin A*) on liposome uptake in an *in-vitro* cell culture. The hypothesis of this project is that reversing epigenetic changes in cancer cells will enhance the drug-encapsulated liposome uptake in prostate cancer cells. The first step of this two-part liposomal drug delivery project is presented here: cell culture techniques, selection of the drugs used, and MTT analysis of the treated cells at 24-hour and 48-hour time periods. After quantification of cells and compilation of the data from the trials presented in this paper, it was determined that higher concentrations of the selected drugs show a decrease in cell proliferation at the given time periods. Consequently, the experiments presented here in Part I will be built upon next semester in Part II—the actual formulation and encapsulation of the liposomes.

Neural Network Formation and Response to Pharmacological Stimulation

Tarun Daniel, Foundation Fellow
Dr. Steven Stice, Animal & Dairy Science, College of Agricultural & Environmental Sciences

Recently, efficient testing platforms for developmental neurotoxicant (DNT) screenings have been increasingly achieved through the use of the micro-electrode array (MEA) system, which is a tool that allows researchers to monitor complex spatial and

temporal patterns of neural network firing. Electrophysiological monitoring with the MEA provides the opportunity to observe the organization and response of an entire neural network to pharmacological reagents or neurotoxicants. MEAs provide a cost and time-efficient alternative to *in vivo* DNT testing. The electrophysiological activity recorded can be used to monitor the changes caused by dosage of pharmacological reagents, as different pharmacological reagents will produce a characteristic effect on the pattern of activity such as changes in mean firing rate and other burst parameters. This work will examine the response of stem cell derived mouse motor neurons to bicuculline and lindane, providing a foundation for future testing of many different reagents and solidifying a new model for DNT screenings.

Regulatory Pathway of X-Polymer Formation in *Bacillus* Species

Lauren Davis
Dr. Maor Bar-Peled, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

We recently identified a polysaccharide, named X-polymer that is made when certain *Bacillus* species are grown in a defined medium. While clarification of the chemical structure of the glyco-polymer is ongoing, I am investigating potential genes that are involved in the regulation and production of X-polymer in my research. To do this, I am examining wild type and mutant strains of *Bacillus* species known to produce this polysaccharide that are impaired in signaling, phosphorylation, or stress responses. The detection of the polysaccharide in these strains is carried out in several steps. First, the crude X-polymer is isolated from the cells and hydrolyzed to monosaccharides. Then, the sugars are reduced and alditol-acetate derivatized to volatile compounds. These sugar-derived compounds are separated by gas-chromatography and analyzed by mass spectrometry (GC-MS). This method allows us to quantify the relative amount of sugars that are composed of the X-polymer and determine if none, normal, or higher amount of the X-polymer is made in the various mutant lines. In my poster I will provide examples of genes involved in the regulation of this metabolic pathway.

A Systematic Review of Adverse Effects Resulting from Administration of Propofol in Domestic Dogs and Cats

Lauren Dempsey, CURO Research Assistant
Dr. Erik Hofmeister, Small Animal Medicine & Surgery, College of Veterinary Medicine

Propofol, a sedative-hypnotic akyl phenol, is widely used in both induction and maintenance of veterinary anesthesia. It is known for being helpful for its ability to produce unconsciousness in a patient within as little as 30 seconds while also decreasing incidence of postoperative nausea and vomiting when administered with any anesthetic drug. However, when used for induction and administration, anesthetic-related adverse effects can appear. The objective of this systematic review was to identify the most common adverse effects when propofol was administered and the amount of propofol administered, compare the adverse effects with other factors regarding the anesthetic procedure such as its rate and if it was co-induced with another agent, and observe the difference in the occurrence of specific adverse effects between dogs and cats. This study can be used by anesthesiologists as a reference for the potential adverse effects that could occur with the administration of propofol. A comprehensive search of research literature was performed using Pubmed, CAB Abstracts, and the University of Georgia's library system from September 2015 to December 2015. The most common adverse effect observed with the administration of propofol was apnea. Other fairly common

adverse effects observed were bradycardia, hypotension, pain on injection, tachycardia, and increased motor activity. It is anticipated that there is a correlation between the administration of propofol in cats and dogs and the number of adverse effects that occur.

Extracellular Vesicle Dependent Transfer of a Virulence Factor Confers Human Infectivity to *Trypanosoma brucei brucei*

Lauren Dennison, Foundation Fellow, CURO Research Assistant
Dr. Stephen Hajduk, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Trypanosoma brucei rhodesiense is the causative agent of human African sleeping sickness. The related subspecies *Trypanosoma brucei brucei* is able to establish infection in cattle, but is highly susceptible to lysis by a subclass of human high-density lipoproteins called trypanosome lytic factor (TLF) and therefore unable to cause human African trypanosomiasis. *T. b. rhodesiense* is resistant to TLF due to the serum resistance-associated (SRA) protein, a virulence factor localized to the parasite endosome that binds and inhibits TLF following endocytosis. Recently our lab has shown that African trypanosomes produce nanotubes that arise from initial budding of the flagellar membrane and vesicularize into heterologous 80 nm extracellular vesicles (EVs). Mass spectrometry analysis showed these EVs are enriched in flagellar proteins that contribute to virulence, and western blot analysis showed that *T. b. rhodesiense* EVs contain SRA protein necessary for human infectivity. Additionally, co-cultivation of *T. b. brucei* and SRA expressing *T. b. rhodesiense* in a trans-well chamber which blocked direct cell-cell contact but allowed EV diffusion conferred TLF resistance to *T. b. brucei* suggesting EVs play a role in disease pathology. In an effort to understand the function of EV mediated secretion during host infection, we show that upon incubating SRA expressing cells with TLF, EVs purified from the cells now contain TLF proteins. The detection of TLF proteins in EVs is cell dependent, as TLF could not be detected in EVs incubated with TLF alone. This suggests vesicle mediated secretion provides a mechanism of protein efflux, which may play an important role in trypanosome survival in the host.

Influence of Intelligence on Correlation between Personality and Recreational Marijuana Use

Ketki Desai, Luvika Gupta
Dr. Lawrence Sweet, Psychology, Franklin College of Arts & Sciences

Recreational marijuana use prevention and cessation programs emphasize identification of personality traits and cognitive factors that increase the individual's risk for use. Previous research indicates that initiation and frequency of marijuana use are associated with specific personality traits and intelligence. A better understanding of how these risk factors influence use behavior would enhance personalized treatments. The aim of this study is to examine the premise that certain personality traits correlate with marijuana use while controlling nicotine dependence severity, and to determine if intelligence moderates this relationship. Data was collected from 90 rural nicotine dependent cigarette smokers who completed personality and intelligence assessments. Personality traits of interest include neuroticism, conscientiousness, and openness from the Neuroticism-Extraversion-Openness Five-Factor Inventory (NEO-FFI). The Wechsler Test of Adult Reading (WTAR) was utilized to assess intelligence. Self-report measures were administered to assess recreational marijuana use frequency and nicotine dependence severity. Based on prior literature, it is predicted that high frequency of marijuana use will correlate with high neuroticism, low conscientiousness, and high

openness. It is further predicted that intelligence will moderate these relationships. The results are expected to increase understanding of the psychological processes involved in marijuana use initiation and maintenance, which may allow prevention and cessation programs to tailor interventions based on a patient's individual personality and cognitive function.

Addressing Severe Mental Illness of Atlanta's Chronically Homeless
Kaley Desher, CURO Research Assistant
Dr. Nathan Hansen, Health Promotion & Behavior, College of Public Health

The widespread prevalence of severe mental illness among the chronically homeless in Atlanta, Georgia is high; there are 1,322 individuals suffering from chronic homeless as of 2014. An expected 60% of these people are predicted to have a severe accompanying mental illness such as schizophrenia, depressive disorder, bipolar disorder, and/or post-traumatic stress disorder. Most of these individuals are not receiving any treatment. The social and economic consequences of this problem are dire. The debilitating symptoms associated with these disorders drastically diminish these individuals' quality of life and potential to contribute to society. Furthermore, the government incurs significant costs by the overuse of services, such as emergency room visits, hospitalizations, shelter stays, and incarcerations that is characteristic of this demographic. In order to mitigate these negative effects, the City of Atlanta should form a contract with a coalition of local nonprofit organizations working on mental illness and chronic homelessness in the city in an attempt to maximize their impact.

The Influence of Social Conversation Case Study: Iran Nuclear Deal
Samuel Dickinson
Dr. Itai Himelboim, Grady College of Journalism & Mass Communication

When it comes to international public opinion, influence takes the form of a trifecta: governments and non-governmental organizations, traditional media coverage, and grassroots activity. Social media, a relative newcomer, has only recently enjoyed the power to influence public opinion as a result of the widespread and strategic social network involvement of all three actors. The increasing relevance of this new media warrants a case study analysis measuring the scope of its sway and the interplay among key stakeholders. The Iran Nuclear Deal, a highly visible and politically-charged agreement, is proposed here as a case study, examining the role of each trifecta segment in sparking and sustaining conversation using Crimson Hexagon—a social listening tool. In doing so, we will outline the relationship between social media commentary and more cemented information outlets, providing an outline of observed trends that will serve as a comparison for future research.

Oral Histories of the Vazov Machine Works
Iva Dimitrova, CURO Summer Fellow
Prof. Callie Holmes, Richard B. Russell Library for Political Research and Studies

I researched the history of the Vazov Machine Works (VMZ, in Bulgarian) in the city of Sopot, Bulgaria using oral history methodology. I conducted a series of interviews with previous workers to better understand the defense plant's social and economic role in varying scopes, extending from the local to the regional and national. Interviews were recorded using a Zoom H5 recorder and were structured as one-on-one conversations where I acted as the interviewer. Questions pertained to the participants' early life, their work at the plant, and other personal experiences and

reflections. While the workers described the plant through their personal experiences, their work life was directly affected by the larger trends of the economy and the government of Bulgaria, especially after the democratic transition starting in 1990. By comparing responses across interviews, I was thus able to draw larger conclusions about the effect of notable events, trends, and perceptions on local history, as experienced by individual people. While these interviews highlighted VMZ's historical significance, they also raised the concern of anonymity. As a response to this concern, the original scope of my project changed to exclude the photographic and visual materials I had initially recorded, and only include audio interviews, edited to remove personally-identifying information. In addition, I have worked to transcribe the transcripts into Bulgarian and translate them into English to be accessible to multiple audiences.

A Study of Transposon Movement in *C. bescii*

Jessica Dinsmore, CURO Graduation Distinction
Dr. Mike Adams, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

As our oil reserves are depleting, scientists are searching for alternative fuel sources. A promising renewable fuel source is cellulosic biofuels. Consolidated bioprocessing (CBP) is a potential strategy of generating these biofuels in an economically feasible way. CBP involves using genetically engineered organisms to convert biomass into ethanol in a single step. *Caldicellulosiruptor bescii* is an excellent candidate for CBP as it is the most thermophilic cellulolytic microbe known. While *C. bescii* does not natively produce ethanol, previous studies have demonstrated that *C. bescii* can be engineered for ethanol production. As with any organism used for industrial purposes, *C. bescii* must have a stable phenotype. Recently, transposon activity has been observed within strains of *C. bescii*. Because these transpositions could compromise the integrity of the desired phenotype, we are interested in determining whether this high rate of transposon activity is a native phenomenon in *C. bescii* or whether it has arisen due to the procedures used to isolate certain strains. The purpose of this study is to monitor the activity of transposons within *C. bescii* as well as to determine the parent strain responsible for this high rate of transposon activity. We will use southern blots to observe and compare the locations of the transposons within various strains, including those with documented transposon movement, wild type *C. bescii*, and strains isolated in a different manner. We will also grow wild type *C. bescii* under a variety of stressors to determine if high transposon movement is native to *C. bescii*.

Engineering Soybean Mosaic Virus Resistance Utilizing tasiRNA

Andrew Disharoon, CURO Research Assistant
Dr. Wayne Parrott, Crop & Soil Sciences, College of Agricultural & Environmental Sciences

Soybeans, as one of the largest crops in cultivation, are constantly under attack by diseases. One of the most common diseases affecting soybeans internationally is the soybean mosaic virus. Food supply safety is a growing concern that must be addressed through new solutions as old techniques falter in the face of evolving diseases and increasing demand. Gene silencing is a powerful tool that many plants use to regulate their own gene expression. In this case, if gene-silencing could turn off the genes of the invading virus, the plant would be resistant. Even before the causal mechanism was known, genetic engineers have used gene silencing to combat viral disease. With a greater understanding of these silencing mechanisms, genetic engineers can create more efficient ways to induce gene

silencing. One such method is using a specific type of miRNA pathway known as tasiRNA, which is found within crop plants, and using it to induce the desired silencing. By placing a tasiRNA 22 DNA recognition site in the front part of the viral DNA, resistance to soybean mosaic virus should be achievable. Accordingly, vectors for silencing the positive sense, negative sense, and a combination of the two strands of the virus were constructed. These events were introduced into Jack soybean tissue to generate transgenic lines for each vector. Events will be phenotyped for disease resistance upon reaching 20 cm in height. It is expected that not only can this approach impart viral resistance to soybean mosaic virus, but also to all other related viruses.

Creating a Pseudo-Random Number Generator Using the Spectral Analysis Test and Genetic Algorithms

Steve Dixon, CURO Honors Scholar, CURO Research Assistant
Dr. Walter Potter, Computer Science, Franklin College of Arts & Sciences

Pseudo-random number generators use pre-calculated mathematical formulas to produce sequences of numbers that appear random. The need for pseudo-random numbers arises for many purposes. The two most important are data security such as ATM cards, computer passwords, and electronic commerce, and the other is modeling and simulation applications such as the programs that predicate the path of cataclysmic weather events. A genetic algorithm is a problem-solving formula that mimics the process of natural selection. Our genetic algorithm generates each individual with its own "genetic makeup". "Chromosomes" are swapped through crossover and/or mutated to breed a new generation of individuals. Individuals with a higher fitness level will "breed" more often. For our experiment, we used the spectral test as fitness criteria. The spectral test returns a number called a P-value between zero and one, with zero being completely non-random and one being completely random. The spectral test works by finding patterns. The harder it is to find the pattern, the more random the sequence is and the higher its p-value. We use this value as the fitness criteria for the genetic algorithm. The purpose of this experiment is to determine if this combination of algorithms would produce a statistically superior psuedo-random number generator.

The Effects of Inclement Weather on Dining Hall Usage

Rutvik Dmello
Dr. Nikhil Srinivasan, Management Information Systems, Terry College of Business

One of the most important things in running any business smoothly is being able to predict the volume with which customers arrive. This is even truer in the service industry, where staffing and resource allocation directly respond to how busy the business expects to be. For the University of Georgia, this problem is best recognized in the dining hall facilities. While there are many factors that obviously impact dining hall usage, one potentially important variable is the weather. Using regression analysis, my research aims to analyze the impact of precipitation on dining hall attendance. The weather information was attained through the website of the Weather Channel. I gathered contemporary dining hall capacity data through a Java program that I created especially for parsing usage information. Historical data were available through the Information Technology Auxiliary Services. After cleaning the collected data through Microsoft Excel, I utilized the R programming language in order to perform regression analyses. In addition to using simple ordinary least squares regressions, I applied the statistical approach of indicator variables. Both of these methods aim to

elucidate the relationship between precipitation and the utilization of dining hall facilities. Beyond analyzing usage in the aggregate, I was able to stratify the data into the individual attendances of the food service locations. I believe after robust statistical scrutiny, my results could be of significant value to the Department of Food Services. This benefit extends additionally to understanding the mechanics behind service industry utilization.

Seeing the Future: Interactive Data Visualization and Behavioral Intentions
Grace Donnelly
Dr. Bartosz Wojdynski, Grady College of Journalism & Mass Communication

This research project seeks to contribute knowledge to our understanding of how design decisions related to the graphical depiction of data and deployment of interactivity influence news consumers' ability to accurately understand health information and make decisions about their behavior. Specifically, a 2 (data presentation: text-only, text and graphics) x 2 (future self-reference: yes/no) between subject experiment was designed to test the effects of using an interactive online life-expectancy calculator on recall, perceived risks, and behavioral intent. An online calculator page was built and developed for this project that allowed users to input their age, gender, and race and receive average life expectancy information based on U.S. data. Participants were then allowed to input indicators of their exercise per week and smoking behavior to gauge the impact of their actions on their future selves. Conditions varied in how participants' life expectancy was communicated to them, and the degree to which the effects of their present-day choices on future outcomes were made explicit. In the experiment, participants (N =100) were randomly assigned to one of four conditions and asked to use an online life expectancy calculator and then answer a series of dependent measures, including recall of information presented, perceived risk perceptions, and behavior intent measures. Data collection is planned for March 2016. The results of the study have implications for best practices in visually communicating quantitative information to audiences in a way that has both affective and cognitive impact.

Caveolae in 3D Neuronal Cell Cultures
Megan Douglass, CURO Research Assistant
Dr. William Kisaalita, College of Engineering

Traditionally, 2D cell-based assays have shown to be unreliable for drug discovery, as they are not predictive of the *in vivo* response. Therefore, significant importance is being given to providing the cells with a 3D microenvironment that more closely mimics *in vivo* conditions. Cells grown in a 3D microenvironment (microtissue) can be characterized by structural and functional biomarkers that are different from their 2D counterparts. The presence of caveolae, which are 60 – 80 nm, cup-shaped invaginations in the plasma membrane, has been well established in many cell types but has not yet been confirmed in cells of neuronal origin. In this study, the presence and functionality of caveolae in neuroblastoma (SH-SY5Y) cells were examined. Transmission Electron Microscopy (TEM) imaging confirmed the presence of invaginated structures in the cells, closely resembling the physical descriptions of caveolae. Subsequently, the functionality of the caveolae was examined by measuring calcium oscillation frequency, which was found to be similar to *in vivo*, in 3D compared to 2D. These findings present a structural and functional biomarker that may be used to confirm the 3D characteristics of neuronal cells and subsequently establish more predictive 3D cell-based assays for drug discovery.

Abstracts

Identification of CRISPR Adaptation Complexes and Associated Nucleic Acids in *Pyrococcus furiosus*

Justin Dumrongkulraksa, CURO Honors Scholar, CURO Summer Fellow
Dr. Michael Terns, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

CRISPR (Clustered, Regularly Interspaced, Short Palindromic Repeats) loci and their associated genes (Cas) comprise an adaptive defense system in bacteria and archaea. This immune system protects the organism against phages and other foreign genetic elements. Immunity is conferred via the acquisition and incorporation of invader DNA into the CRISPR locus. The locus is then transcribed to produce an RNA complement (crRNA), which guides Cas nucleases in targeted invader DNA or RNA destruction. In the archaeon *Pyrococcus furiosus*, our lab has recently obtained genetic evidence linking four Cas proteins (Cas 1, Cas 2, and Cas4-1 and 4-2) to the function of integration of new invader sequences in a process called CRISPR adaptation. However, the individual roles of each protein in the process are unknown and will be an area of exploration in my research. To examine how each of these proteins functions in the cell, a number of experiments will be performed in order to test whether or not each protein is a member of a larger functional complex. Additionally, the ability of each protein to bind, recognize, or capture CRISPR and invader DNA will be tested. A CRISPR locus sequence called the leader is required for adaptation. As Cas 1, Cas 2, Cas 4-1, and Cas 4-2 are believed to have some role in adaptation, the leader along with invader DNA is expected to be found when these proteins are immunoprecipitated. This finding would provide substantial insight into this relatively new system.

Ecosystem Services and Restoration Efforts of Campus Forests: Tanyard Creek and Driftmier Woods

Dessa Dunn
Dr. Elizabeth King, Odum School of Ecology

Driftmier Woods is a small forest on UGA's campus overgrown with invasive plant species. There are plans to use prescribed grazing by the Chew Crew goats to reduce invasive plants, but they may affect other parts of the ecosystem. The Chew Crew project can therefore provide a living laboratory to study the interactions between land management and ecosystem services, which are benefits provided by the forest. I first compiled a portfolio of potential ecosystem services and hypothesized goat impacts. Then I focused on ecological roles of leaf litter and English ivy, an invasive plant that covers the ground in parts of Driftmier Woods. While goats consume English ivy, their hooves can disturb soil and leaf litter, lowering soil stability and risking water erosion. To study goat impacts on leaf litter, I first studied the Chew Crew's current site, Tanyard Creek, by comparing quantity and size distribution of leaf litter particles inside and outside goat exclosures. I then assessed potential impacts of goats versus hand removal of ivy at Driftmier Woods. In a non-grazing area, I set up plots in which I removed ivy manually, simulated goat browsing by plucking leaves, or left the ivy as a control. I measured litter, soil moisture, and litter decomposition rates in each plot. Goat impacts on leaf litter at Tanyard Creek proved statistically insignificant, and results from Driftmier Woods are forthcoming. Combined, these studies help assess the Chew Crew's impacts and provide a base for future students to study forest ecosystem services on campus.

What is a Sticking Event in Classical Molecular Dynamics? A Study of Hydrogen Sticking to Amorphous Water-Ice

John Dupuy
Dr. Phillip Stancil, Physics & Astronomy, Franklin College of Arts & Sciences

Gas-grain and gas-phase reactions dominate the formation of molecules in the interstellar medium (ISM). Gas-grain reactions require a substrate on which the reaction is able to occur. The formation of molecular hydrogen in the ISM is a prime example of a gas-grain reaction. In these reactions, an atom of hydrogen will strike a surface, stick to the surface, interact with the molecular structure of the substrate (in this case water), find another H atom, form molecular hydrogen, and then be ejected from the surface. We perform classical molecular dynamics (MD) simulations of hydrogen atoms sticking to an amorphous water-ice surface. This study examines the first step in the process, the sticking of the hydrogen atom to the substrate. We present here possible criteria for sticking and detail on how we arrived at those criteria.

Financial Education in Georgia Public Schools and its Impact on Students' Financial Behaviors

Ana Duron-Fleck, CURO Honors Scholar
Dr. Brenda Cude, Financial Planning, Housing & Consumer Economics, College of Family & Consumer Sciences

In the state of Georgia, public high school students are required to take an economics course with a personal finance section in it in order to graduate from high school. In this project we are focusing on whether or not the class taken in high school had any significant impact on the students' financial behaviors. Two data sets are used in this study. The surveys were conducted online and consisted of 463 students, 111 of which were seniors and 352 of which were freshman. Questions were asked about their financial education in high school and whether or not they benefited from the experience. In addition, the surveys were intended to gather information about the students' current financial behaviors. An example of this is whether or not the student owns a credit card they are responsible for or if they are responsible for any loans. It will be interesting to see whether or not the students' experiences in the high school course have a significant impact on students' monetary habits and whether or not they even recall the information they learned while taking the course. We hope to see that the course has had an impact in students' financial lives. However, in the senior data set, we expect to see that the students no longer recall the content learned in their personal finance course.

Abundance of *Vibrio* Bacteria Associated with White Pox Disease in Elkhorn Corals

Martinique Edwards, CURO Research Assistant
Dr. Erin Lipp, ENVIRONMENTAL HLTH SCI -- Public Health

Caribbean coral reefs have declined by 80% over the past decade in part due to the spread of marine diseases. Corals host a mutualistic bacterial community in their surface mucus that serves as protection against pathogenic microbes. This bacterial community may be altered in favor of pathogens when the coral becomes stressed, for example by elevated temperature. Of particular interest are the *Vibrio* bacteria, which are ubiquitous in coastal waters and are implicated in six of twenty coral diseases described. We are studying the critically threatened Caribbean elkhorn coral, *Acropora palmata*, the only species known to succumb to white pox disease. We hypothesize that there is an increased relative abundance of *Vibrio* bacteria on disease lesions compared to the surface mucus of healthy corals. To investigate, we extracted the total bacterial DNA from 4-ml samples (n=5-6) of coral mucus and surrounding water. We then performed quantitative PCR (qPCR) on the bacterial DNA with *Vibrio*-specific primers and non-specific bacterial primers to enumerate both the *Vibrio* population and the entire bacterial community throughout all samples. We will calculate the

ratio of *Vibrio* cells to the total number of bacterial cells and expect a higher ratio of *Vibrio* to total bacteria in samples taken from disease lesions. Researching the population dynamics of *Vibrio* on diseased corals will help elucidate the driving force behind coral disease and decline. If diseased corals are found to be a reservoir for *Vibrio* bacteria, then the biochemical interactions between *Vibrio* cells and coral mucus should be investigated.

Comparative Analysis of Soil Organic Matter Fractionation in Ultisols

Rachel Ehlinger
Dr. Alexander Cherkinsky, Geology, Franklin College of Arts & Sciences

Soil organic matter is one of the largest reservoirs of carbon on earth, containing more carbon than the atmosphere itself. Fractionation and accelerator mass spectrometry are used to study the turnover of soil organic matter carbon from its initial state in the biosphere to its decay in the atmosphere. In this study, we separated microaggregates from Ultisol soils collected in the Calhoun Critical Zone of South Carolina. These microaggregates were separated into heavy and light fractions through physical fractionation methods. The heavy fraction is depleted of organics, while the light fraction is enriched with organics. We then took these samples for AMS radiocarbon dating in order to analyze the turnover rate of each fraction. With this analysis, we are able to interpret the turnover rate of carbon for each fraction. Our results allow us to conclude that the heavier organically depleted fraction has a slower turnover rate and is therefore better preserved in the environment.

Deficiencies and Improvements to Mental Health Institutions in Georgia

Joseph Elengickal
Dr. Leonard Martin, Psychology, Franklin College of Arts & Sciences

A major issue with inpatient mental health institutions is that patient visits can be traumatic. This is because mental health institutions do well at their intended function, keeping suicidal patients alive until their doctors find a sustainable medication type and dose, but inpatient programs do very little past that. Many inpatient programs do not have legitimate methods for coping therapy and rely solely on preliminary therapy. In addition, the relationship between nurses and patients is tense due to the hierarchal structure of the hospital as well as the lack of oversight. While inpatient programs fulfill the status quo, policy change is necessary because many patients do not attend other therapy programs after their inpatient stay, thus making their limited time valuable. In order to examine this situation, the laws related to mental health institutions on the local, state, and national level will be analyzed. Furthermore, research into how other states and countries run their mental health institutions may lead to useful insight into how to improve Georgia's institutions. Also, data collected from past patient visits will reveal trends that may lead to viable solutions to the problem. This research hopes to attain multiple policy solutions that strive to solve problems related to mental health institutions.

Evaluation of Yield and Essential Oil Content of Holy Basil Varieties

Nicole Encardes, CURO Research Assistant
Prof. David Berle, Horticulture, College of Agricultural & Environmental Sciences

Holy basil (*Ocimum tenuiflorum*) is an important medicinal plant that has been associated with decrease in stress, regulation of metabolism, and reduction of inflammation. In many cultures it is used as a tea. The study evaluated yield and essential oil content of *O. tenuiflorum* varieties to determine the best for commercial production. Plants from 14 holy basil varieties were selected from commercial catalogs and the USDA Germplasm systems. Plants were

grown in the field, harvested, and biomass recorded before and after drying. Essential oils were extracted from each sample by hydrodistillation. Varieties were ranked using an index score that was a combination of yield and essential oil content per plant. The top five yielders included both USDA and commercial varieties, including PI288779, Amrita, PI652059, PI652057, and Kapoor. Results indicate an inverse relationship between biomass yield and essential oil content, suggesting that growers should not use biomass as the sole characteristic for variety selection.

Analysis of Hybridization in Chattahoochee Bass (*Micropterus chattahoochae*) Populations below Lake Lanier

Guy Eroh, Foundation Fellow
Dr. Byron Freeman, Odum School of Ecology

Maintenance of fish species diversity is intrinsically and ecologically valuable, but challenging in areas where cross-stocking of ecologically similar species occurs. The Chattahoochee bass (*Micropterus chattahoochae*) is a cryptic species that is difficult to distinguish visually from other closely related species of the genus *Micropterus* (black basses). *M chattahoochae* is endemic to the Chattahoochee watershed in Northwest Georgia where several other black bass species have been stocked. These introduced species pose threats to the Chattahoochee bass through competition and interbreeding. In order to determine if pure populations of *M. chattahoochae* remain in tributaries of the Chatahoochee River below Buford Dam, this study analyzed the genetic identities of several populations of bass below Lake Lanier. Bass samples were taken by electrofishing or rod and reel angling from the Chattahoochee River and tributaries including Hillabahatchee, Snake, and Whooping Creeks. Specimens were also collected from the Maricao River in Puerto Rico, where a population has been established. DNA was extracted from fin tissue and amplified using polymerase chain reaction. To evaluate hybridization in the *M. chattahoochae* populations, a nuclear (ITS2) and a mitochondrial (CO1) gene were sequenced and compared to known *Micropterus* species sequences. Additionally, six microsatellite loci (known to cross amplify and discriminate between related species) were amplified and analyzed. Analysis of microsatellites and nuclear and mitochondrial DNA will identify fish hybridization and backcrossing in these Chattahoochee bass populations.

MGMT Expression in Canine Glial Tumors

Erika Evanoff, CURO Research Assistant
Dr. Elizabeth Howerth, Pathology, College of Veterinary Medicine

This study is being conducted in order to investigate whether or not canine glial tumors express the MGMT protein and if these tumors have hypermethylation within their MGMT promoter region, as these may be indicators of a positive response to cancer treatment with temozolomide. Formalin fixed paraffin embedded tissue from canine glial tumor tissues (oligodendrogliomas and astrocytomas) submitted to the College of Veterinary Medicine Department of Pathology and Athens Veterinary Diagnostic Laboratory from 2005-present were evaluated. Twenty-two glial tumor tissues were tested for MGMT protein expression by immunohistochemistry (IHC). In order to prepare for the methylation-specific PCR portion of this study (to be performed in Spring 2016), genomic DNA from the tissues was isolated and bisulfite conversion of the DNA was performed. Findings from IHC reveal that high-grade glial tumors had the greatest amount of MGMT protein expression with 5 out of 11 (45.5%) having positive staining. In contrast, low- grade oligodendrogliomas and astrocytomas all had

negative staining results. In Spring 2016, methylation-specific PCR will be performed in order to determine if there is a correlation between MGMT protein expression and MGMT promoter region methylation.

Best Practice for Informing Parents of their Newborn's Disability

Allison Fialkowski, CURO Honors Scholar, CURO Summer Fellow
Dr. David Gast, Communication Sciences & Special Education, College of Education

Bad news is news that "drastically and negatively" changes a person's perception of his or her future providing "a feeling of no hope... a risk of upsetting an established lifestyle" (Buckman, 1992; Bor, Miller, Goldman, & Scher, 1993, p.70). This research studies the disclosure of what most families perceive to be devastating news - a disability of their newborn. Because physicians are the primary messengers of this challenging news, medical schools and continuing education services must train physicians in the central considerations that lead to the most positive disclosure process when informing parents of their newborn's disability (Harnett, 2007, p.92). After reading literature concerning best practice for informing individuals, analyzing a physician's training, and understanding the specific concerns and circumstances of families with a newborn with a congenital disability, I identified the central considerations that physicians must make throughout this disclosure process. By addressing these concerns, physicians can ensure a positive experience that prevents parents' distress and anxiety, fosters a strong relationship between the parents and professionals, and assists in attachment between the parents and child.

Characterization of a Muconic Acid Biosensor-Reporter System in *E. coli*

Tyler Fischer, CURO Research Assistant
Dr. Yajun Yan, College of Engineering

Over the past decades, metabolic engineering has proven its superiority on the microbial production of valuable chemicals such as biofuels, pharmaceuticals, nutraceuticals, and materials. To build microbial cell factories that efficiently convert a feedstock into a desired product, metabolic engineers have developed several strategies to direct the intracellular metabolites into the exogenously introduced pathways, including overexpressing rate-limiting enzymes, blocking competing pathways, and bypassing native regulations. However, the directed metabolite fluxes generally resulted in metabolism imbalance which would inhibit cell growth and decrease production in heterologous pathways when the engineered enzymes or intermediates accumulated toxic levels. To monitor the metabolic status of the engineered pathway in real time, Dr. Yajun Yan's laboratory is focusing on creating a transcription factor-based biosensor to alleviate the imbalance metabolism. Transcriptional factors (TFs) are natural sensory proteins that regulate gene expression in response to environmental changes or key intracellular signals which need tight control. They bind to specific DNA sequences in a promoter region to either activate or repress transcription. The DNA-binding activity of TFs can be affected by binding to metabolites. Recently, Dr. Yan's group is exploiting an exogenous TF to monitor the product of muconic acid (a renewable precursor to polyethylene terephthalate and nylon with global sales of $51 billion) in *Escherichia. coli*. However, native TFs always suffer from poor orthogonality and background noise due to uncharacterized interactions between candidate TFs and operator sites in native promoters. Thus, Dr. Yajun Yan's group is focusing on designing hybrid promoters to improve the specificity and sensitivity of TF-based biosensors in response to the concentration of muconic acid. To simplify the screening process, a sensor-reporter system is designed to evaluate the strength of hybrid promoters by monitoring the fluorescence intensity of green

fluorescence protein. In this project, I deeply understand the mechanism of the muconic acid sensor-reporter system and have received systematical training on the basic experimental skills of molecular biology and the design of biochemical experiments. During this process, my critical thinking abilities have greatly enhanced by discussing the experiment with the graduate students.

Optimization of Biogas to Electricity Plant

Carter Fitzgerald, CURO Research Assistant
Dr. Sudhagar Mani, College of Engineering

Recently, much has been made of the increase in the price and reduction of quantity of fossil fuels such as oil, coal, and natural gas. It is widely accepted that biogas, which is a mixture of carbon dioxide and methane, can be produced via anaerobic digestion. Anaerobic digestion is the series of biological processes where organic material is broken down by microorganisms, particularly methanogenic bacteria, in the absence of oxygen. This biogas can be burned to produce electricity, compressed to make compressed natural gas, or compressed even further to form liquid natural gas. The leftover organic material can be used as compost bedding or as fertilizer. The starting organic material that is fed into the anaerobic digestion process can range from cellulose to municipal solid wastes. This versatility is a huge reason for the advantages of biogas, because while it may not be as energy dense as its fossil fuel counterpart, it has other advantages: the source of the energy is renewable and, in the case of cellulose, the net carbon production is zero. After biogas is produced in the digestion tank or chamber it is a mixture of about 60% methane and 40% carbon dioxide. The gas is then scrubbed to increase the purity of the gas to 98% methane which is then sent to be compressed. The hot, high-pressure gas leaves the burner and enters an expansion turbine which turns a generator and produces electricity. Using process modeling software, multiple process variables can be manipulated in order to find the optimal composition, flowrate, and process unit sizes based on economic feasibility. The purpose of this research is to optimize the production of electricity from biogas and run cost analysis on the entire process to find a range of biogas prices where production is profitable.

Injury Risk of Major League Foul Balls

Zack Flagel, CURO Research Assistant
Prof. Nathaniel Grow, Insurance, Legal Studies, and Real Estate, Terry College of Business

Currently, Major League Baseball does not have a standardized policy that requires stadiums to have netting to protect fans from foul balls and broken bats flying into the stands. In other words, fans sitting above the dugouts or down the foul lines often do not have such protection and are at risk to injury. This research paper attempts to ascertain the extent to which fans attending Major League Baseball games are at risk of being injured by foul balls leaving the field of play. Specifically, this paper attempts to quantify the extent to which injury risk and injury severity have increased over time. It identifies several factors that increase spectator risk. Perhaps most notably, new major league ballparks that have opened over the last few decades have been designed with smaller areas of foul territory, thus putting fans closer to the field. Moreover, average pitch velocity has steadily increased over the last decade, helping to cause balls hit off the bat to travel even faster. These prominent factors, along with a multitude of other distractions, have caused the fans' reaction time to decrease. Through statistical analysis documenting the actual changes of stadiums' foul territories and pitchers' pitch velocities, this paper concludes that the injury risk for fans sitting in unprotected seats close to the field of play has increased significantly in the last few decades.

Abstracts

Design of Mass Concrete Specimens and Test Procedures
Rashaan Fowles
Dr. Mi Geum Chorzepa, College of Engineering

The goal of this research is to design specimens to quantify temperature loss and gain in mass concrete structures and develop test procedures for mass concrete specimens for a Georgia Department of Transportation project. There are two important parameters that need to be quantified in mass concrete specimens: (1) maximum internal temperature; and (2) gradient temperature. Current GDOT specification for mass concrete (special provision to the Section 500) includes the maximum allowable internal temperature of 158 °F and temperature differential of 35 °F between interior and exterior portions of the designated mass concrete element. The need to quantify and understand these two parameters and structural behavior is pertinent. This research will focus on understanding the underlying thermal behavior of mass concrete structures through the review of available literature on the subject of mass concrete mix designs and crack width measurement. As it is essential to study temperatures and temperature differences in several common types of mass concrete elements or placement configurations, simple thermal analysis models will be created to validate test procedures and specimens configurations developed during this study.

What Good is a Low-Carbon City if No One Can Afford to Live There?
Shreya Ganeshan, Foundation Fellow, CURO Summer Fellow, CURO Research Assistant
Dr. Jennifer Rice, Geography, Franklin College of Arts & Sciences

Cities increasingly embrace "climate friendly" policies that encourage alternative forms of transportation, incentivize green building and urban infill, and provide environmental services to residents, such as recycling and composting. Meanwhile, corporate investment attracts skilled labor into the technology spheres and specialized industries and significant capital inflows into these cities. Tensions between population growth and "green innovation" pull urban landscapes in opposite directions. The "Emerald City" of Seattle, WA is lauded for its high percentages of walking and biking work commuters and pristine air quality. Census and municipal survey data, however, reveal a different narrative. Median housing values in Seattle have surpassed the $500,000 mark for the first time ever. Energy efficient skyscrapers and "apodment"-style housing have become the built environment norm. In a pattern of carbon gentrification, an influx of high-earning individuals, who can afford to live in the city center and utilize the low-carbon modes of work commute, has crowded out lower-income families. As a result, Seattle faces a new political challenge: providing affordable housing and low carbon lifestyles simultaneously. We argue that conventional production-based representations of urban greenhouse gas (GHG) inventory data fail to display individual consumer contributions to emissions, which hinders the development of targeted public policies. This research disaggregates road passenger transport emissions to provide insight into individual responsibilities for emissions. We identify a need for policy that not only attempts to curb GHG output from transportation, the highest emitting civilian activity, but also the social and economic changes to urban design and governance.

Enzymatically Preparing Carbohydrates for Development of an Effective Treatment against a Bacterial Pathogen
Nikhil Gangasani, CURO Honors Scholar, CURO Summer Fellow
Dr. Fikri Avci, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Pneumococcal diseases like pneumonia are currently a major global health issue. Caused by *Streptococcus pneumoniae* bacteria, these diseases are responsible for up to 1.6 million annual deaths globally, according to the World Health Organization. In particular, *S. pneumoniae serotype III* (Pn3) has increasingly victimized children under the age of five, who represent more than half of global victims. The worldwide proliferation of microbial resistance to antibiotics accentuates the need for more effective pneumococcal vaccines. Glycoconjugate vaccines, composed of carbohydrates covalently linked to carrier proteins, alleviate this issue. The Pn3 bacterium expresses a carbohydrate coating on its microbial surface called a capsular polysaccharide (CPS). Breaking down the Pn3 CPS into fragments of suitable size and composition provides a carbohydrate source for creating a glycoconjugate vaccine against the Pn3 bacterium. In 1931, another bacterium called *Bacillus circulans* was found to secrete an enzyme that degrades the CPS of Pn3. Through a series of experiments, the *B. Circulans* enzyme has been purified and its size has been determined. Furthermore, the interactions between the enzyme and the Pn3 CPS have been studied and the means of CPS degradation are now understood. Ideal conditions for the enzymatic degradation of the Pn3 CPS have been established, and the size of the main degradation products themselves have been determined. Utilizing what is now known about the Pn3 CPS and the *B. Circulans* enzyme that degrades it, future research efforts will work towards creating an effective treatment against the harmful Pn3 bacterial pathogen.

Diet-Induced Obesity is Associated with a Change in Intestinal Innervation and Disruption of Gut-Brain Communication

Brent Gawey
Dr. Krzysztof Czaja, Veterinary Biosciences & Diagnostic Imaging, College of Veterinary Medicine

Obesity has become an important topic in modern healthcare, as obesity rates continue to rise at an alarming rate. In the past thirty years, obesity rates have nearly doubled, with adolescent obesity rates reaching levels almost quadruple their previous levels thirty years ago (Ogden 2014). As obesity becomes more widespread, efforts to understand the consequences of an unhealthy diet and the effects of being overweight are of utmost importance as obesity-related health problems rack up a total of $190.2 billion dollars annually (Teuner 2013). Current studies focus their investigations on body weight in regards to obesity; however, body weight is not an accurate measure of adiposity. In our study, we wanted to understand if caloric value of the diet was the only factor inducing obesity. To test our question, we obtained a sample of twelve rats and randomly assigned rats in groups of four to three different diet groups (low fat, high fat, regular diet). The rats were maintained on a regular diet for nine days and then were fed their designated diet for twenty-eight days. Over the course of the experiment, we measured each rat's body composition using a Minispec LF110. The Minispec LF110 is a machine that uses TD-NMR to measure body composition (fat, lean, free and total body water). This machine allowed us to analyze the living rats without having to use anesthesia to prevent animal movement, as the TD-NMR technology allows for accurate measurements even with little movements from the animal during analysis. Following euthanasia on the twenty-ninth day of the experiment, we measured the liver fat percentage using the Minispec LF110. Additionally, we used neuroanatomical methods and immunohistochemical techniques to measure inflammation in the hindbrain by staining microglia with IBA1 and to check for neural reorganization in the hindbrain by staining non-myelinated fibers with IB4. We found that rats maintained on low fat and high fat diets had body fat compositions that were significantly greater than the regular diet. We did not find any

significant changes in microglia activation (inflammation) in the hindbrain at the given fat levels of the diets. However, we did find neural reorganization of the hindbrain in both the high fat and low fat diets. Our results suggest that a balanced diet of macronutrients is key for optimal health. Consuming high-fat, greasy foods or low-fat diet products can both lead to interrupted satiety signaling between the gut and the brain. Therefore, in effective diet strategies, the caloric density should not be the main focus, but rather a focus on consuming a balanced diet of macronutrients, avoiding any high or low extremes of any given nutrient.

Personality Judgment Accuracy: Personality and Social Context Influence the Way People See Each Other

Catriona Geddes, CURO Honors Scholar
Dr. Brian Haas, Psychology, Franklin College of Arts & Sciences

Effective social interactions often depend on people making quick judgments about one another. The purpose of the study is to investigate how people differ in their ability to determine other people's personality traits and how social context affects the accuracy of personality judgments. In the current study, we characterized individual differences in personality recognition at two time points: during first impressions and following an interpersonal task. In addition, we tested whether social context—interpersonal closeness, competition, or cooperation—had an impact on personality judgment accuracy. We hypothesize that people who score higher in extraversion will be more accurate in reading their partner's traits and those who participate in the interpersonal closeness condition, compared to the other conditions, will be more accurate in reading the personality traits of others. The participants first come in individually and complete a personality inventory (NEO) and a ten-item personality inventory (TIPI). Then as a pair, participants complete a three-minute arbitrary question session, allowing for superficial interaction, and then a forty-five minute activity of one of the interpersonal conditions. The participants complete a TIPI survey for their partners after both activities, allowing us to characterize how well the participants read their partners' traits based on first impression and again after more time. We can then test for an association between a person's personality traits and judgment accuracy. This study holds the potential to identify traits that render a person to be a good judge of character.

Functions of HAN in *Arabidopsis* Embryo Development

Julian Gendreau, CURO Research Assistant
Dr. Wolfgang Lukowitz, Plant Biology, Franklin College of Arts & Sciences

The GATA transcription factor HANABA TARANU (HAN) regulates embryonic patterning in *Arabidopsis thaliana*. We have previously shown that two closely related GATA factors, HAN LIKE 1 (HANL1) and HAN LIKE 2 (HANL2), can substitute for HAN function when expressed with the HAN promoter in mutant embryos. HAN, HANL1, and HANL2 share two recognizable structural motifs: a central B-class GATA zinc-finger domain shared with seven other *Arabidopsis* genes; and a short, N-terminal sequence specific to the HAN clade and called HAN domain. The HAN domain is required for HAN function and deeply conserved in HAN orthologs of all flowering plants, but its molecular function has not been uncovered. My research aims at investigating the function of the two structural motifs of HAN genes by systematic gene and motif swapping experiments. I have expressed the remaining seven members of the B-type GATA factors of *Arabidopsis* under the control of the HAN promoter in mutant embryos and found that only one of them, GATA29, can substitute for HAN. GATA29 lacks a HAN domain;

however, a closer inspection of the GATA29 protein sequence revealed the presence of an N-terminal EAR motif. EAR motifs have been shown to promote transcriptional repression by binding co-repressors of the TOPLESS family. I have hypothesized that the HAN domain may serve a similar function and also constitute a transcriptional repressor domain. Consistent with this view, the EAR motif of GATA29 can be replaced with a HAN motif, and the HAN motif with the well-studied EAR motif of the *Arabidopsis* IAA17 protein. In addition, adding either an IAA17 EAR motif or a HAN domain to the N-terminus of GATA16, which contains a B-class zinc finger but fails to rescue mutant embryos in swap experiments, creates a mosaic protein with HAN function. I conclude that the HAN domain is a repressor domain and biochemically equivalent to an EAR motif. In addition, I have replaced the B-class zinc finger of HAN with A-, C-, and D-class zinc fingers. While mosaic proteins with an A- or D-class zinc finger are inactive, HAN variants with a C-type zinc finger, surprisingly, can complement mutant embryos. This result would suggest that B-class and C-class zinc fingers have similar properties. I am now examining T-DNA constructs in which the three C-class zinc finger genes of *Arabidopsis* are expressed with the HAN promoter, to explore possible functional redundancies.

Passive Drug Delivery for Intraocular Applications

Alyssa Ghuman, CURO Research Assistant
Dr. Hitesh Handa, College of Engineering

The current treatments available for patients who suffer from ocular diseases such as glaucoma, diabetic retinopathy, and age-related macular degeneration include daily eye drops and monthly intraocular injections. In order to avoid blindness, treatment for these diseases must be administered on a regular basis, with some treatments requiring lifelong administration. This work studies a refillable, implantable ocular drug delivery device as a long-term solution to patients who undergo the inconvenience and discomfort of frequent doctor visits and monthly injections. In this study, three different micro-channel designs, along with the modification of the channel surfaces, are tested for the diffusion of various dyes as a model for drug delivery. A refillable device with a three-year time span reduces the number of required doctor visits and prevents frequent replacements of the device, greatly improving patient life.

A Faulty System: An Empirical Analysis on Student Loan Default

Connor Gibbs
Dr. Brenda Cude, Financial Planning, Housing & Consumer Economics, College of Family & Consumer Sciences

This study expands student loan policy literature, focusing on shifting from a grant and merit-based financial aid system to one based on repayable student loans. While this policy change provides educational opportunities to individuals who otherwise could not go to college, it also had led to an increase in the student loan default rate. Given associated negative macroeconomic outcomes such as postponed household formation, decreased homeownership, and decreased consumption, this study attempts to empirically evaluate default through a multiple regression model to predict one's own probability of default. This methodology was driven by evidence that for-profit institutions may enroll non-traditional students who qualify for federal student loans but inadequately prepare them for the workforce. The model utilizes four predictor variables: institution type, degree completion status, salary after completion of school, and time after school completion to employment. The results could inform policymakers' choice to lobby for more federal oversight of for-profit universities or even adjusting state funding

formulas to make public universities more attractive for nontraditional students. The research could assist policymakers as they sort an array of policy solutions to lower the growing default rate, improve the welfare of student borrowers, and mitigate the negative economic outcomes of default.

Methadone and Loperamide Interactions with the Multidrug Transporter P-Glycoprotein

Morgan Gibbs, CURO Research Assistant
Dr. Arthur Roberts, Pharmaceutical & Biomedical Sciences, College of Pharmacy

The multidrug transporter P-glycoprotein (Pgp) serves as gatekeeper of the blood brain barrier by effluxing toxins away from the brain, but in doing so, it also prevents the entry of beneficial drugs. Despite similarities in their molecular structures, the opioid agonist loperamide has essentially no brain penetration compared with the opioid agonist methadone. This is because loperamide is effluxed at 4 times the rate of methadone by Pgp. Despite several studies with these drugs and Pgp, the molecular reason for these differences is not well understood. To unravel the molecular basis of loperamide and methadone transport by Pgp, these drugs were investigated using ATP hydrolysis assays, fluorescence and NMR. Pgp-mediated ATP hydrolysis with methadone and loperamide suggests that they have one and two binding sites, respectively, and that methadone competes with one of the loperamide binding sites on Pgp. The interactions of loperamide and methadone with Pgp were also investigated by NMR and found to be consistent with the Pgp-mediated ATP hydrolysis results. These drugs also showed large differences in their ability to induce global conformational changes of Pgp by fluorescence spectroscopy. From these results, a conformationally gated model of opioid agonist transport is proposed to explain the molecular basis of their transport.

Serum Levels of Circulating and Exosomal MicroRNA Regulate Transformed Cell Growth

Nicole Gilreath
Dr. Ralph Tripp, Infectious Diseases, College of Veterinary Medicine

Serum is an essential component of cell culture media and provides the necessary growth factors and biomolecules for efficient cell growth. Fetal bovine serum (FBS) is the most common source of serum, but has several drawbacks including cost, lot to lot variation, and ethical concerns related to its procurement. Various types of chemically defined media are also available but often are more expensive, and in some cases unable to support cell growth as efficiently as FBS. This study examines if variations in pattern or type of serum microRNA expression influence the growth rate of Madine-Darby Canine Kidney (MDCK) cells. We hypothesized that FBS samples contain specific exosome-associated microRNA(s) that impact cell growth parameters. Serum samples from several commercial sources were evaluated for miRNAs from exosomes and within the serum. RT-qPCR was used to identify specific serum microRNAs, and the serum samples were assessed for their ability to support the growth rate of MDCK cells using both manual and automated cell counting methods. Several miRNAs were found to be highly upregulated in serum samples that yielded higher MDCK cell growth rates. The miRNAs that yielded higher growth yields will be validated by testing miRNA mimics and inhibitors for their potential to alter cellular and viral growth kinetics.

Measuring Muscle Fatigue in Men vs Women Using Mechanomyography

Shaun Goh
Dr. Kevin McCully, Kinesiology, College of Education

Previous studies have suggested that women have greater skeletal muscle endurance than men. The purpose of this study was to test this hypothesis using mechanomyography to measure the endurance of the forearm muscles in men and women. Twitch electrical stimulation was used to produce muscle contractions in the forearm muscle of subjects at frequencies of 2, 4, and 6 Hz while a tri-axial accelerometer measured the acceleration of each contraction. Fatigue was estimated with an endurance index (EI), which was final acceleration divided by initial acceleration. Peak acceleration was greater in men than that of women (PA=3.3G +/- 0.9 and 2.2G +/- 0.2 respectively). Women had a greater average endurance index than men (EI=84.1% +/- 3.7% and 77.4% +/- 2.1% respectively). A T-test between the two groups for endurance yielded a P value of 0.11. The study results are underpowered, and additional participants will be tested. However, the magnitude of different between men and women are consistent with previous studies. The mechanism explaining differences between men and women in muscle fatigue needs to be evaluated in future studies.

Neutrophil and Granulocyte Methylation in Normal Weight and Obese Individuals

Jenissa Gordon, CURO Summer Fellow
Dr. Hea-Jin Park, Foods & Nutrition, College of Family & Consumer Sciences

Folate acts as a one-carbon methyl donor, modulating epigenetic activity. Blood contains mixed populations of white blood cells of varying DNA methylation status, and may be responsible for inconclusive reports of variable DNA methylation responses to folic acid (FA) supplementation. A single cell type may serve as a more reliable epigenetic reporter to determine DNA methylation changes due to FA supplementation. Obesity influences folate status and increases risk for neural tube defects, but the impact of obesity on epigenetic responses following FA supplementation has not been investigated. FA was provided (800 μg/d) to normal weight (NW; BMI 21.6+ 1.4 kg/m2; n=12) and obese (OB; BMI 37.5+ 2.3 kg/m2; n=6) women of childbearing age for 8 weeks. Genome-wide DNA methylation changes in CD4+ T cells (CD4) and CD16+ neutrophils (CD16) were determined using Infinium HumanMethylation 450BeadChips. Increased folate status was observed, but OB women at baseline had lower serum folate concentration than NW women; this trend was maintained after supplementation. Methylation changes in response to supplementation were more abundant in CD4 than CD16 in both OB (12.4% vs. 3.1%) and NW (4.6% vs. 1.7%) women. A small number of CpG sites responded in both cell types (0.1% and 0.6% of total CpG sites in NW and OB, respectively). Our results indicate that DNA methylation response following FA supplementation is distinctive in each cell type and obesity affects the epigenetic regulation in response to folate status. Findings provide preliminary evidence to develop cell-type specific biomarkers of folate status unique to obesity.

Improving Efficacy of HIV Vaccines for Immune-Suppressed Recipient

Ann Gore, CURO Research Assistant
Dr. Lisa Shollenberger McEwen, Infectious Diseases, College of Veterinary Medicine

HIV affects millions worldwide, and vaccines have not previously been effective. The Harn lab developed VacSIM, a novel vaccine delivery method in which a liquid forms a gel matrix upon entry into the recipient. Previous studies have proved this delivery method more efficacious than CpG, alum, and Fruend's adjuvant. The delivery method has been tested in the flu vaccine model as well and found it to work well for viral clearance in mice. We decided to then test the efficacy of VacSIM in an Envelope-based HIV vaccine.

To do this, we combined an HIV Envelope protein and VacSIM and administered it to mice via subcutaneous vaccination. We then used ELISAs to determine endpoint titers of HIV-specific antibodies in the blood of vaccinated animals. This experiment showed that VacSIM was by far the best for humoral response, with or without CpG adjuvant. This semester, we are continuing the experiment to study the efficacy of VacSIM-delivered HIV vaccines in mice chronically infected with *Schistosoma mansoin,* which causes immunosuppression. We will vaccinate either infected or uninfected mice with the HIV proteins Envelope and Gag in VacSIM and test humoral responses to Envelope via ELISAs and cellular responses to Gag via ELISpots.

Credit Usage and Financial Literacy among University Students

Theodore Gorman
Dr. Brenda Cude, Financial Planning, Housing & Consumer Economics, College of Family & Consumer Sciences

We know the general criteria for good credit use. We know what distinguishes a solid credit score from a weak one, and we know which actions can lead to a particular score. But in all this research, information about a crucial demographic is left largely unexplored: college students, and in particular those who are working to improve their ability to manage their own finances. With a data set compiling information from almost a thousand UGA students' credit reports, we can look more closely at the foundations of strong credit use among students, as well as examine instances where problems arose. Given the continual rise of both college tuition and competition in the US job market, college students have to be thriftier than ever, and having a good credit history has never mattered more. Our data show the effects of authorized versus individual user account ownership, and we can now compare the credit standing of students who have had help from their parents and those who have not. With all this in mind, we've worked to organize and analyze this data set with the intention of producing a provable hypothesis in the form of a research paper.

Evolutionary Analysis of Mating-Type Genes in *Stagonosporopsis* Species Causing Gummy Stem Blight of Cucurbits

Thomas Gottilla, CURO Research Assistant
Dr. Marin Talbot Brewer, Plant Pathology, College of Agricultural & Environmental Sciences

Gummy stem blight of cucurbits has recently been discovered to be caused by three genetically distinct but morphologically indistinguishable fungal species: *Stagonosporopsis cucurbitacearum*, *Stagonosporopsis citrulli*, and *Stagonosporopsis caricae*. A key biological difference among these species may be their mating systems, and specifically the presence and structure of the *MAT1-1-1* and *MAT1-2-1* genes, which together compose the *MAT1* locus. Genes associated with reproduction tend to diverge rapidly, so our objectives were to identify the genes and determine if the genes are rapidly evolving. This would include analyses for both positive and purifying selection. Genomes of the three species were searched for homologs, and tests for positive and purifying selection were conducted primarily in the form of dn/ds analyses. The results of these analyses show that the dn/ds ratio for the three species is less than one, suggesting that the three fungal species are undergoing purifying selection. However, the evolutionary constraints on the three species were significantly different than those affecting the outgroups; although both ratios were less than one, the two ratios were significantly different. Concrete evidence of positive selection in mating-type genes may provide evidence that distinct speciation among *S. caricae, S. citrulli*, and *S. cucurbitacearum* is occurring. Because the

MAT1-1-1 and *MAT1-2-1* genes contained in the mating-type locus are associated with several functions ranging from host recognition to the formation of reproductive structures, understanding the evolutionary factors acting on the *MAT1* locus could be critical in understanding the emergence of new fungal species.

Effect of Multiple Ankle Sprains on Functional Performance Tests in Adolescents

Morgan Green, CURO Honors Scholar
Dr. Cathleen Brown Crowell, Kinesiology, College of Education

Ankle sprains are the most common sports injury among athletes and the initial sprain often occurs during adolescence. Functional performance tests are commonly used in injury screens, but it is unclear if adolescents with a history of sprain demonstrate deficits. The purpose of this study was to determine if a significant difference in functional performance ability was present between adolescent athletes with a history of a single ankle sprain versus multiple sprains in the star excursion balance test (SEBT) and single leg hop test (SLHT). We hypothesized the athletes with a history of multiple ankle sprains would perform significantly worse on a SEBT and SLHT than the single ankle sprain athletes. Adolescent soccer players (8 male, 13 female, 15.6±1.3 yrs.) completed surveys to report the number of previous ankle sprains. Each participant performed three trials of the SEBT and two trials of the SLHT to measure functional performance of the ankle. Overall, the subjects with a history of multiple ankle sprains performed significantly worse on the SEBT (69.1±9.3, $p < .001$) and SLHT (18.0±4.1, $p < .001$) than the single ankle sprain athletes (SEBT-99.8±4.9, SLHT-7.2±.7). A history of multiple ankle sprains negatively affects ankle joint function in an adolescent population. Future research may include prospectively tracking ankle sprains over a competitive season to determine the clinical utility of specific cut-off scores for determining those at risk for ankle sprain.

Corporate Inversion: Companies Leaving the American Tax System

Jazmine Griffin, CURO Honors Scholar
Dr. Jeff Netter, Banking & Finance, Terry College of Business

The current Pfizer-Allergan merger is an example of a particular trend in United States mergers and acquisitions, corporate inversions. In corporate inversion, an American corporation may merge with another foreign corporation and move to overseas headquarters. This allows the originally American corporation to escape taxes on income earned abroad. In the case of Pfizer, one of the largest pharmaceutical companies in the United States, merging with Allergan will allow them to move their headquarters to Ireland. Many companies seek tax havens, countries with less stringent tax laws and lower rates, to escape foreign income tax in America. Currently, America taxes foreign income at 35% upon returning to U.S. soil. This tax falls on top of the income taxes corporations already pay in the location income is earned. To avoid the tax burden American companies keep approximately 2.6 trillion abroad. The president, congress, and even some politicians are trying to find solutions to this problem. In the following presentation, we will discover the strategies companies use to avoid U.S. foreign taxation, and the potential income America is losing. To examine the mechanics of corporate inversion we will analyze current corporate inversion deals including, Pfizer-Allergan, Tyco-Johnson, and Applied Materials. From there, we will discuss the pros and cons in America's tax systems and the strategies politicians and congress have devised to keep U.S. corporations from exiting.

Abstracts

Women, Welfare, and Borrowing
Shannon Griffiths, CURO Research Assistant
Brittany Talkin
Dr. Mary Caplan, School of Social Work

The U.S. credit market is awash in credit products for all economic strata of society, and many are marketed toward credit-constrained people. 62% of low-income families have a credit card, and 32% of people who qualify for the Supplemental Nutrition Program (SNAP) have consumer debt. At the same time, approximately 34% of Americans receive some form of means-tested social assistance. The purpose of this study is to examine how and to what extent welfare recipients utilize these consumer borrowing opportunities. This study employs grounded theory design using semi-structured interviews with women over the age of 18 currently receiving means-tested social assistance and using some sort of borrowing, like payday loans, pawn shop loans, revolving credit cards, title loans, and other informal loans. The social process of borrowing is examined using Charmez's constructivist grounded theory approach, including systematic coding, memo writing, and theory development. The research team has conceptualized the study, created and refined interview questions, recruited informants, conducted participant and non-participant observations, conducted interviews, and analyzed data. Informants were recruited through professional networks as well as posting flyers throughout the community, and snowball sampling was used. The main research question is, "What are the borrowing attitudes and behavior of women who receive public means-tested social assistance?" The nascent framework contains three interconnected concepts: 1) complicated methods of borrowing affects and is affected by complex life circumstances; 2) access to credit provides hope, but increases economic vulnerability and self-doubt; and 3) balance between personal responsibility and social pressures.

Procedural Polarization: Examining Changes in the Roll Call Voting Record (1877-2012) and their Effects on Political Polarization
Casey Grippando, CURO Summer Fellow
Dr. Anthony Madonna, Political Science, School of Public & International Affairs

Recently, much attention has been given to the role of partisan politics within the American Congress; namely, how the polarization of American political parties appears more pronounced than ever. The question to be answered then is why modern times have produced the appearance of a polarized political system and whether this problem is as extreme as it appears. We believe that an increase in requests for roll call votes has contributed to this polarized image of Congress. Using the *Congressional Record*, roll call voting data on amendments from 1877 – 2012 was coded in Microsoft Excel and amassed with existing research on previous sessions of Congress to statistically uncover partisan voting and procedural patterns. Variables coded included various Congressional procedural tactics, member party, and type of vote, amongst others. Votes on measures of little importance (more specifically, votes on measures not considered "landmark legislation") were largely ignored. The results so far are as expected: amending activity on legislation has largely increased within both parties, and more amendments have received roll call votes. This in turn creates more party line votes and thus the polarized image of Congress we see today. Given the large range and depth of data, we believe the results are extremely important and applicable when judging the polarization of the current and future Congresses. It is also important in demonstrating that a volume of votes rather than a pure shift in ideology could be at fault for increased polarization.

Metallothermic Reductions and Conductive Coatings for Lithium-Ion Battery Anode Materials

Bryan Grommersch, CURO Summer Fellow
Dr. Ramaraja Ramasamy, College of Engineering

The chemical technology inherent in lithium-ion batteries has not kept pace with the portable electronics and automobiles that depend on them. Fossilized silica (SiO2) frustules, or shells, of the fresh-water diatom *Aulacoseira* feature intricate pores and shapes which make them a promising template for a lithium battery anode. It is believed that retaining these intricacies after a magnesiothermic reduction to Mg2Si and silicon will yield batteries of superior capacity and cyclability. Subsequently coating these microparticles with a conductive polymer promises to improve their electrochemical properties even further. Metallothermic reductions of Al2O3 and GeO2 were also explored in this project, as was the creation of silicon microparticles via an alternative SiCl4 synthesis.

Lunchroom Table Talkers Talk Students into Eating Fruits and Vegetables

Taylor Gutwillig
Dr. Michelle vanDellen, Psychology, Franklin College of Arts & Sciences

Changes to the National School Lunch Program require schools to provide students receiving a school lunch with two fruit and vegetable servings, but this change has produced high plate waste. In the present study, we draw on principles of behavioral economics to try to nudge students to choose and consume more fruits and vegetables. We developed a low cost intervention using brightly colored, age appropriate table talkers to introduce students to eight fruits and vegetables. Each side of the table talker shows a fun fact rather than health information, as previous research has shown highlighting health related information can decrease consumption. A baseline data collection of fruit and vegetable waste was performed in each school through observing students (kindergarten to fifth grade) in the lunchroom. During an intervention period, half of the schools (chosen by random assignment) received table talkers to place on lunchroom tables. Preliminary results showed that in the control schools, which were not exposed to the table talkers, fruit and vegetable consumption decreased. However, fruit and vegetable consumption remained the same in intervention schools (i.e., did not decrease). An explanation of these findings and their implications for understanding the decisions made by students in the lunchroom and how school programs can promote healthy eating while decreasing the waste and increasing the consumption of fruit and vegetables will be discussed.

Examining a Potential Role for *Mycobacterium tuberculosis* CtpB in Copper Transport

Sahl Hakim
Dr. Russell Karls, Infectious Diseases, College of Veterinary Medicine

Mycobacterium tuberculosis is the cause of human tuberculosis, a chronic and sometimes fatal respiratory infection. The *ctpB* gene in *M. tuberculosis* is annotated to encode Cation Transport Protein B (CtpB) predicted to function as a copper-transporting ATPase. Copper is an essential mineral for many biological processes, but when present in excess can be toxic. The overall goal of this project is to examine the function of *ctpB* when expressed in nonpathogenic *Mycobacterium smegmatis*. The *ctpB* gene will be cloned with a c-myc tag into a mycobacterial expression vector downstream from a tetracycline-inducible promoter. The plasmid will be introduced into *M. smegmatis*. The transformed cells will be induced with varying tetracycline concentrations alone and in the

presence of copper ions. If CtpB is a copper efflux pump, then the expression of the gene is predicted to render the bacteria more resistant to the excess copper compared to the wildtype bacteria. If the CtpB is a copper influx pump, then the expression of the gene is expected to render the bacteria more sensitive to elevated levels of copper. To determine if the protein is made, western blotting will be performed to detect the presence of the myc-tagged CtpB protein. Results of this project will be presented.

Examination of Supply-Side Incentives and Motivations That Perpetuate the Skill Mismatch of Cambodian University Graduates

Hanna Han
Dr. Audrey Haynes, Political Science, School of Public & International Affairs

In Cambodia, the increased enrollment in higher education has not significantly led to a more robust economy as many university graduates remain un- or underemployed. This unusual phenomenon can be ascribed to the graduates' skill mismatch, or the disparity between the labor supply of universities and the labor demand of employers. This study attempts to understand the supply-side incentives and motivations that contribute to the skills mismatch. In short, why university students decide upon the majors and career paths they do. The study makes use of six hour-long semi-structured focus groups with current Cambodian university students stratified according to major and university type (public or private). Coding analysis of qualitative data reveals the major supply-side problem to be the lack of accurate career information and exposure to a diversity of career options, misguided conclusions about labor demand based on economic observations, and societal and familial pressures. This study is significant in that it will inform Cambodian educators, employers, and policymakers about the incentives and motivations encouraging the current skill mismatch, which will then allow them to craft policy solutions to alter incentives. The study also will inform USAID, the World Bank, and other international organizations that implement education development programs within Cambodia about the skill mismatch, which will allow them to alter existing programs or create new ones in order to address the issue and prevent its exacerbation.

Microwave Synthesis of MOF-5

Allie Harbert, CURO Research Assistant
Dr. Douglas Jackson, Chemistry, Franklin College of Arts & Sciences

Metal organic frameworks are an area of research of increasing interest. Organic linkers of various complexities and potentials for activity can be linked together with metal centers to form a porous crystal. Their porous nature combined with their very large surface area allows for MOFs to be ideal substances to store gases as well as capture them. These crystals have great potential for application in different areas including gas storage and capture for environmental and energy uses as well as for delivering drugs, since essentially any linker with at least two reactive sites can be used. This experiment focused on simplifying the process of forming a known MOF, MOF-5, which is formed using Zinc Nitrate and Terephthalic Acid, and has been previously formed using reflux over a period of 48 hours. MOF 5 has previously been analyzed using x-ray powder diffraction. The goal of this experiment was to devise a new reaction scheme to cut down reaction time and maximize yield in order to expand upon the new methodology to more efficiently synthesize more complex MOFs that have applications of interest. This reaction time has been successfully cut down to 50 minutes using microwave chemistry and DMF as the solvent. The MOF was able to be crystallized out and analyzed using X-ray crystallography.

Abstracts

Agrobacterium tumefaciens Mediated Transformation of _Mimulus nasutus_ via the Floral Dip Method

Leanna Harbor
Dr. Andrea Sweigart, Genetics, Franklin College of Arts & Sciences

Agrobacterium tumefaciens mediated transformation is a powerful genetic tool and both floral dip and vacuum infiltration methods have been incredibly successful in the model plant *Arabidopsis thaliana*. *Mimulus* is an emerging model plant genus studied by ecologists and evolutionary geneticists. The study of *Mimulus* species would greatly benefit from genetic transformation and, in fact, the floral dip vacuum infiltration method has been previously successful in transforming the self-pollinating *Mimulus nasutus* species. Stable germ-line transformation was confirmed in the T3 generation through BASTA resistance screening and PCR analysis conducted on the surviving T3 seedlings. However, successful transformation has not been repeatable, highlighting the need for an optimized protocol. In this study, the goal was to optimize *Agrobacterium* mediated transformation of *Mimulus nasutus* by testing a variety of controlled conditions to determine which treatment yields successful transformation. The conditions tested were varying concentrations of Silwet L-77, inoculation technique of either floral dip or floral dip and vacuum infiltration, and repetition of the inoculation treatment. Mature seeds from the inoculated plants were collected and planted to undergo BASTA resistance screening. The number of seeds produced by plants in each condition group greatly differed between the treatment conditions, with some conditions resulting in the production of much fewer seeds. The BASTA resistance screening is ongoing, but available results of plants that have completed resistance screening show no successful transformation events. The transformation process will be repeated on additional *Mimulus nasutus* plants, with altered treatment conditions in addition to a greatly increased sample size.

Hurricane Forecasting and Healthcare Facility Evacuations

Elizabeth Hardister, CURO Honors Scholar
Dr. Curtis Harris, Institute for Disaster Management, College of Public Health

Hurricanes have the potential to produce mega mass casualty and mass fatality events in addition to catastrophic structural damage. The state of Georgia is located in an area vulnerable to hurricanes originating in both the Atlantic Ocean and the Gulf of Mexico; however, Georgia's response to a major hurricane has not yet been tested. While forecasting and emergency planning have greatly improved over the past few decades, recent history demonstrates that hurricanes still have the potential to result in catastrophic loss of life. The successful evacuation of coastal healthcare facilities in response to an impending hurricane requires advanced notice, timely decision making, and an unprecedented coordination effort between coastal and inland facilities. However, government planning assumptions do not accommodate the additional challenges faced by coastal healthcare facilities during severe weather evacuations, specifically, the advanced timelines needed, and the limitations of early hurricane forecasting models.

Conference Calls and Tax Forecasting

Jennifer Hardister, CURO Honors Scholar
Dr. Erin Towery, J.M. Tull School of Accounting, Terry College of Business

Conference calls are one medium from which analysts obtain financial information from company management. Companies typically divide these calls into scripted and discussion sections. In the scripted portion, company managers present analysts with information

about the financial performance of the firm. During the following discussion portion, analysts are able to question managers. Financial analysts then use information gathered from these calls to prepare estimates of financial measures such as net income. This paper analyzes mentions of tax in quarterly conference calls of public companies and their relation to changes in analysts' forecast properties. This analysis provides evidence of the utility of these calls for analyst tax forecasting. Preliminary results suggest management mention of taxes in the scripted portion correlate with improved analyst forecasts.

Effect of Preoperative Laboratory Testing on Anesthesia-Related Decision Making in Apparently Healthy Dogs

Kayla Hargrove
Dr. Erik Hofmeister, Small Animal Medicine & Surgery, College of Veterinary Medicine

The objective of this retrospective study was to determine if the results of pre-operative laboratory testing in otherwise healthy dogs influence anesthesia-related decision making. These decisions include additional non-diagnostic procedures, cancellation/postponement of surgery, intravenous fluid rates, repetition of laboratory tests, monitoring and management techniques, further tests conducted, change in ASA risk status, changes to client communication, and avoidance of NSAIDs. It was hypothesized that few surgeries would be cancelled, but that other anesthetic decisions would be altered on the basis of laboratory results. One hundred dogs that underwent elective orthopedic surgeries and had a complete blood cell count, serum chemistry, and urinalysis performed were selected. All cases were reviewed by 5 veterinary anesthesiologists. Out of 100 dogs, 0% would have additional surgeries or procedures, 6% would have their procedure cancelled or postponed, 38% would have fluid therapy altered, 32% would have laboratory tests repeated, 9% would have changes made to monitoring while anesthetized, 15% would have management techniques altered, 12% would have further tests conducted, 13% would have their risk status changed, 20% would have changes in client communication, and 59% would have NSAIDs eliminated from treatment. It is recommended that routine pre-operative laboratory testing be conducted in healthy dogs presenting for elective orthopedic procedures.

Assessment of Adult Pig Cognition Utilizing an Open Field and Object Recognition Test

Kayla Hargrove
Dr. Franklin West, Animal & Dairy Science, College of Agricultural & Environmental Sciences

Behavioral testing allows for the evaluation of learning and memory, and is an integral component for assessing functional deficits in current models of neural injury and disease. Pigs have become a model of interest for neurobehavioral research based on morphologic similarities to the human brain. Studies assessing neurodevelopment in pigs have revealed that they possess sophisticated cognitive abilities; however, further optimization to assess learning and memory capabilities are needed. The present study utilized object recognition testing and open field testing as a means of assessing spontaneous trial-unique memory, and normal/abnormal behaviors, respectively. We hypothesized that object recognition testing would reveal more time spent investigating novel objects than familiar ones, and that when placed in an open field, pigs would demonstrate exploratory behavior. Four male pigs, approximately 5-6 months of age were used. For the open field test, pigs were placed in the arena for 10 minutes and their behavior recorded. At the start of the object recognition test, two similar objects were

fixed to opposite corners in the arena, and the pigs were allowed to investigate them for 10 minutes, followed by a 10 minute inter-phase interval, and a 10 minute test trial in which one of the previous objects was replaced with a novel object. All open field and object recognition trials were recorded via overhead camera and analyzed with Ethovision software. These tests provide valuable insight on pig cognition, and will allow efficacy assessments for treatments targeting the improvement of learning, memory, and behavior.

In-Vitro and *In-Vivo* Assessment of a Yeast By-Product on the Inhibition of *Histomonas meleagridis*

Caitlin Harris, CURO Research Assistant
Dr. Robert Beckstead, Poultry Science, College of Agricultural & Environmental Sciences

Histomonas meleagridis is an anaerobic protozoan and the causative agent of Blackhead disease. This disease can cause up to 100% mortality in turkeys because the innate immune is not able to identify the parasite as foreign. The objective was to determine if a yeast by-product known to upregulate the innate immune system could inhibit *H. meleagridis in-vitro* and *in-vivo*. For the *in-vitro* trial, *H. meleagridis* cells were incubated in Dwyer's media for 24h at 42oC then flasks containing fresh media were inoculated with 100,000 cells per flask. Cells were treated with several concentrations of yeast by-product and counts were performed after 8 and 48 h. For the direct and indirect *in-vivo* trials, 1 day old poults were obtained and had *ad libitum* access to treatment diets and water. Treatments consisted of varying yeast by-product concentrations. At 18 days old, poults were challenged with *H. meleagridis* cells. For the direct trial, all poults were challenged, and for the indirect trial, 5 out of the 30 poults per treatment were challenged. Mortalities were necropsied for liver and cecal lesions. The direct trial was terminated at 10 days post-infection and the indirect trial was terminated when 80% of the inoculated control birds exhibited Blackhead signs. The results of the *in-vitro* trial determined that the treatments did not inhibit *H. meleagridis* cell growth ($P<0.05$). There were also no significant differences between treatments for the direct trial ($P<0.05$). Lastly, the indirect trial determined that the treatments did not inhibit lateral transmission of Blackhead ($P<0.05$).

Effects of Climatic Legacy on Southern Appalachian Plant Communities in Coweeta Basin

Douglas Hart
Dr. Jeff Hepinstall-Cymerman, Warnell School of Forestry & Natural Resources

In recent decades, the eastern United States has experienced increased precipitation rates, along with a greater frequency of extreme wet and dry years. These trends, along with an absence of occasional fire disturbances, have been hypothesized to allow for "mesophication" to occur within eastern plant communities. Mesophication is a term recent studies have used to describe the recruitment of mesophytic (wet-adapted, drought-intolerant) plants within xeric (dry-adapted, drought-tolerant) plant communities typically dominated by oaks *(Quercus*). As moisture availability increases within these communities, mesophytic species such as maples (*Acer*), tulip poplar (*Liriodendron tulipifera*), and birch (*Betula*) begin to dominate the understory and, if disturbances permit an opening, the canopy. This study examines if mesophication is occurring across a 30-year precipitation gradient in the Coweeta Basin located in Macon County, North Carolina in the southern Appalachian Mountains. Vegetation surveys were conducted in the summer of 2015 across a precipitation gradient in the basin, with sampling locations representing a variety of slope aspects. Differences in the vegetation community are

being explored using multivariate community analysis tools, and are expected to show distinct differences in mesophytic and xeric species composition between communities. Understanding the phenomenon of mesophication is important when considering the future of plant communities under a changing climate. The widespread replacement of oaks and other xeric species with mesophytic species could result in forests with less valuable habitat and food availability for some species, along with less valuable timber for harvesting.

Need of the "Other": Paradox in Gordon Parks' *Airline Terminal* and *American Gothic*

Caroline Harvey
Dr. Janice Simon, Lamar Dodd School of Art

Through an analysis of two photographs produced by Gordon Parks in the mid-20th century, this paper seeks to highlight the paradoxical nature of race relations during the era of Jim Crow and segregation. Rather obviously, whites clung to the comforting idea of segregation as it raised them into the upper echelons of political and economic welfare while it simultaneously disenfranchised America's black population. Because the goal was to keep the races separated, it became less apparent that black and whites were mixing in a crucial setting—employment. Blacks were so economically cast down that they often needed employment from whites, a need that was met by the white's "need" of poor blacks to help with childcare, housekeeping and other menial, sometimes degrading, tasks. Parks noticed this problem, and saw in it the strange need of the "other" between the races. His documentation of this paradox is best seen in two works, *Airline Terminal* (1956) and *American Gothic* (1942), both of which were produced during his role as photojournalist for *Life* and the Farm Security Administration, respectively. Through complex visual analysis influenced by Roland Barthes' *Camera Lucida* (1980) and Connie Choi's contributions to *Witness: Art and Civil Rights in the Sixties* (2014), this paper examines Parks' photographic indictment of the American institution of segregation and Jim Crow law. Furthermore, this argument is additionally influenced by Parks' own memoirs, which bring further clarity to Parks' personal motivation behind his production of *Airline Terminal* and *American Gothic*.

Identifying the Monoclonal Antibody Epitope Peptide Expressed on Pancreatic Adenocarcinoma

Sarah Hatton, CURO Research Assistant
Dr. J. Michael Pierce, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Pancreatic ductal adenocarcinoma (PDAC) is one of the most deadly cancers with one-year and five-year survival rates of only 24% and 5%, respectively. Physicians currently lack useful biomarkers in the screening, diagnosis, and treatment of PDAC which unfortunately leads to the majority of patients being diagnosed in incurable, progressive stages. A mouse monoclonal IgG antibody, known as MAb109, has been developed, isolated, and shown to preferentially react with cancerous pancreatic tissues over non-diseased normal tissue in a disease progressive manner. This antibody binds an N-glycan containing epitope expressed on two specific glycoproteins, CEACAM 5 and CEACAM 6. Isolation of the MAb109-reactive glycopeptides followed by mass spectrometry analysis has identified a single glycopeptide that contains a N-linked glycan. My research focuses primarily on identifying this peptide sequence in model organisms such as the fruitfly (*Drosophila melanogaster*) and zebrafish (*Danio rerio*). A MAb-109 reactive band was detected in *Drosophila* pupae lysate after immunoblotting, and a peptide sequence was found within the fruit fly genome using bioinformatics that denotes a likely candidate

protein. By performing a similar experiment with zebrafish lysate, I hope to identify for the same or related peptide that reacts with the antibody. Future experiments will test the function of the protein containing this peptide during zebrafish organ development. An additional study will be to determine if quantifying the MAb109 epitope in human blood is useful for detecting and monitoring pancreatic cancer. The epitope expressed on cancer cell surfaces may also serve as a potential therapeutic target.

Ballot Initiatives and Voter Turnout
Rory Hibbler, CURO Research Assistant
Dr. Anthony Madonna, Political Science, School of Public & International Affairs

This research analyzes the potential effects of ballot initiatives on voter turnout in national presidential and congressional midterm elections. This research is significant in the political science field because while there has been significant research on ballot initiatives and voter turnout, nothing has been published on these topics since the 1990s to early 2000s. There is a desperate need for an update in this topic, especially since there's a historically low voter turnout rate in recent elections (36.4% in 2014 midterms). I plan on testing this by comparing the turnout of voters in states that utilized ballot initiatives and the turnout in states that did not utilize ballot initiatives throughout a series of presidential elections and midterm elections. No results are available yet.

Drift Between Two Specific Conductivity Probes
Sarah Hickey, CURO Research Assistant
Dr. John Dowd, Geology, Franklin College of Arts & Sciences

As a part of a larger study of the Lake Herrick Watershed, we will be measuring the time it takes for a specific conductance probe constantly taking measurements while submerged in a tributary stream of Lake Herrick to drift from a specific conductance probe calibrated before each measurement in the same stream. This work is significant because it will help us determine how long we can leave the probe in the water before collected data becomes inaccurate. I expect that the probe left in the stream will drift from the probe that will be calibrated before each measurement and will need to be re-calibrated once every four weeks. This study is important because there is limited research published on the amount of drift in the specific probes we are using. Results and conclusions from this research can help improve the data collected for the Lake Herrick Watershed Study and help identify the pollution sources for the lake.

The *speAk* Movement: Social Media for Global Issues
Taylor Hill, CURO Honors Scholar
Prof. Jennifer Smith, Grady College of Journalism & Mass Communication

The *speAk* campaign seeks to answer two questions: first, "What makes a social media campaign successful, reach audiences, or 'go viral'?" The second is "Can social media be used to successfully inform the public of global issues in a more approachable manner and lead to involvement?" In this case, the issue is ocean health and exploitation, which encompasses ecotourism, shark finning, and marine mammal captivity. The research will be broken up into three phases. The first phase involves shooting video shorts that convey these issues in a comical, rather than chastising, fashion. After the videos have been filmed, they will be shown to focus groups in order to gauge audience reaction in terms of their ability to convey these issues in a more informative, approachable, and engaging manner. Post-focus groups, the video shorts will be released through social media outlets such as Twitter, Facebook, and Instagram in order to see if these social media campaigns

are able to gain web traffic to an informative website that will serve as a platform for individuals to engage with organizations supporting these environmental issues. Studying social media and how it can be used as a platform for change is relevant in this digital age where the internet serves as a primary source of information and communication. It is valuable to study whether or not this new media can be used to connect larger audiences to reliable sources of information and involvement in global issues.

Dressing with a Disability
Shannon Hochschild
Dr. Katalin Medvedev, Textiles, Merchandising & Interiors, College of Family & Consumer Sciences

Cerebral palsy (CP) is a contracted disease impairing standard motor functions controlled by the cerebrum and cerebellum. Damage to one or both of these regions obstructs the body's physical mechanisms and intellectual development. Today, comprehending the complexity of CP relies exclusively on information produced by the field of medicine and science. Therefore, there is a need for extensive cultural and social research to solidify the CP population's position and wellbeing in mainstream society. Identification of those moderately and severely afflicted by CP is primarily dependent on dress. The physical abnormalities caused by CP require assistance through dress items such as braces and custom footwear, which indicate to society that a condition exists. Based on experiments regarding postural control and equilibrium in children with CP, continual backwards-walking training exhibited improvements in overall posture and coordination. These findings highlight an opportunity for potential modifications and innovations in dress that would aid the afflicted CP body. The neglect to study CP holistically hinders society's understanding of this medical condition and feasible improvements in the lives of people living with CP. Therefore, conducting future research of CP in the interrelated fields of dress, society, and culture will directly influence beneficial dress modifications and innovations for this population.

Digitally Delicate Primes
Jackson Hopper, CURO Summer Fellow, CURO Research Assistant
Dr. Paul Pollack, MATHEMATICS -- Arts & Sciences

Terence Tao has shown that in any fixed base, a positive proportion of prime numbers cannot have any digit changed and remain prime. In other words, infinitely many primes are "digitally delicate." Tao's work uses sieve methods, a departure from previous work by Cohen, Selfridge, and Sun on the topic using covering systems of the integers. We strengthen this result in a manner suggested by Tao: a positive proportion of primes become composite under any change of a single digit and any insertion a fixed number of arbitrary digits at the beginning or end.

Microplastic Sampling in the Atlantic Ocean
Adam Howington, CURO Research Assistant
Dr. Jenna Jambeck, College of Engineering

Based upon our work of annual mass flows of plastic into our ocean compared with what has been found in the ocean, there are millions of tonnes of plastic in unknown locations. In order to understand potential impacts, it is important to try to determine the location and form of this plastic. In our environment, plastic physically degrades into smaller fragments and pieces, called microplastic, that can both transport organisms (including invasive species) and host their own microbial communities. Plastics also absorb persistent organic pollutants. Plastic debris continues to be found all over the world, and the average size

of plastic particles in the ocean appears to be decreasing, but open ocean sampling published in the literature has consisted primarily of trawl collection of plastic samples 330 um and above. We analyzed open ocean water samples collected through filtration and fractionation on a path from the Canary Islands to Martinique, across the Atlantic. The samples were filtered in the lab and we counted suspected plastic particles in the size range of 20 um to 333 um. Plastic particles will be reported in number per liter of seawater collected.

Evaluation of Cas4 Function in CRISPR-Cas Adaptation

Jesse Hu
Dr. Michael Terns, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Given that viruses are the most abundant biological entities on the planet, prokaryotes have evolved extensive protective systems to defend against genetic invaders. One component of this defense is CRISPR-Cas (clustered regularly interspaced short palindromic repeats–CRISPR-associated), an adaptive prokaryotic immune system found in nearly all archaea and half of prokaryotes. This system is composed of a CRISPR array and Cas proteins. The CRISPR array affords memory of past infections and contains identical repeats separated by sequences known as spacers, which are derived from foreign nucleic acids. CRISPR functions in three stages: adaptation, CRISPR RNA (crRNA) biogenesis, and crRNA guided interference. My research focuses on adaptation, in which Cas proteins capture spacers and incorporate them into the CRISPR array through a process called integration. In *E. coli*, Cas1 and Cas2 form a complex essential for spacer integration, with Cas1 contributing to integrase activity and Cas2 appearing to play a non-enzymatic role. However, the functions of other Cas proteins, such as Cas4, are poorly understood. I aim to elucidate the role that Cas4 proteins in *Pyrococcus furiosus (Pfu)* and *Thermococcus kodakarenesis (Tko)* play in CRISPR-Cas adaptation. Supported by previous *Pfu in vivo* data, I predict that Cas4 plays a critical role in the capture of foreign DNA into CRISPR loci. Therefore, I will evaluate the effect that different Cas4 proteins have on previously developed *in vitro* integration reactions. Further understanding of the roles of distinct Cas4 proteins in adaptation will clarify our understanding of a crucial step in prokaryotic adaptive immunity.

Legal Context to Violating Women

Michael Hutchison
Dr. K. Chad Clay, International Affairs, School of Public & International Affairs

This paper focuses on the role of legal systems on gender equality and human rights advocacy. Common law, Islamic law, Civil law, and Mixed law systems will be measured against physical human rights violations to determine which system performs best in context to religious influence on each legal system; in addition, this paper will discuss discriminatory law absent of religion, law influenced by religion, and the presence of religious extremist groups and how their interaction with a given state and population will affect human rights support and violations. Such a study has not yet been conducted, and results of this paper will illuminate the field of human rights pertaining specifically to women and the causes of violence against this sex in context to the law. This paper intends to discover the importance of religion's role in influencing the performance of legal systems pertaining to women's human rights support and violations.

Applying Computer Vision Analysis to Plant Phenotyping

Tate Hutwagner

Dr. Wayne Parrott, Crop & Soil Sciences, College of Agricultural & Environmental Sciences

Plant phenotyping lags behind in the plant breeding field because of advances in molecular biology making high-throughput genotyping easier. However, plant breeders need to asses plant phenotypes to interpret the genotypic data. Breeders still need to develop methodologies that affordably and efficiently categorize phenotypes. High throughput phenotyping would be useful to evaluate insect resistance in plants. For example, soybeans that resist damage from insects are desirable, as more than 20% defoliation leads to a significant yield and economic loss. Current methodology requires destructive sampling, as leaves must be detached from a plant before damage is measured. One current methodology under review for phenotyping is computer vision; computer vision visually assesses and scores images for characterizing crop traits. However, computer vision has been difficult to use to measure caterpillar damage. Thus, attempts are underway to adapt computer vision to measure insect-caused leaf damage. The first step has been to devise a way to get images of a whole plant—given the 3-dimensional aspects of a plant, imaging from several angles is needed. Next, Open CV, software written in Python and C++, was used to code a program to measure the amount of damage incurred by the plant. Photos of the plant are extracted from the background image utilizing the program. After, the program evaluates holes in the leaves caused by a caterpillar and calculates the percent defoliation. The ability to conduct these measurements in intact plants overcomes the traditional phenotyping bottleneck by utilizing high-throughput methods facilitated by computer vision.

The Influence of Psychosocial Functioning on Tic Severity in Children with Tourette Syndrome

Emily Ivey, Olivia Carlson, Colleen Keeler
Dr. Ronald Blount, Psychology, Franklin College of Arts & Sciences

Objective: Prior research has demonstrated relationships between comorbid psychological disorders, social problems, and increased tic severity in children with Tourette Syndrome (TS). There is also evidence that social problems positively correlate with tic severity. Less research has examined if and how psychological and social problems jointly predict tic severity. This study investigated how social impairment and symptoms of psychological comorbidities in children with TS relate to tic severity. *Methods:* The sample included 46 caregivers of children with TS (M age= 12.80, SD = 2.32). Caregivers reported on children's psychological functioning, social impairment, and tic severity. *Results:* Separation anxiety symptoms, OCD symptoms, and social impairment were significantly correlated with tic severity (rs = .31 to .40, $p < .05$). OCD symptoms were the only significant predictor of tic severity (β = .32, p = .04; R2 = .18, p = .01). Social impairment accounted for significant additional variance when added at Step 2 (ΔR2 = .08, p = .04) and was a significant predictor of tic severity (β = .30, p = .04). OCD symptoms remained a significant predictor of tic severity at Step 2. The overall model accounted for 26.4% of the variance (p = .005). *Conclusion:* More prevalent symptoms of OCD predict greater levels of tic severity. Social impairment also relates to greater tic severity, beyond the contribution of OCD symptoms. Treating comorbid psychological disorders and social skills impairments may reduce tic symptom severity. *Significance:* These findings may guide the development of novel evidence-based treatments for children with TS.

Abstracts

Financial Literacy, Risk Tolerance, and Goals-Based Savings Behavior

Benjamin Jacobs, CURO Research Assistant
Robin Haas
Dr. Swarn Chatterjee, Financial Planning, Housing & Consumer Economics, College of Family & Consumer Sciences

This study uses a national dataset to examine the association among risk tolerance, financial literacy, and goals-based savings behavior of households. The results indicate that three out of five households do not have any emergency funds set aside, and about two out of three households have not calculated how much money they will need for retirement. However, financial literacy is positively associated with risk tolerance; separately, both financial literacy and risk tolerance are associated with goals-based savings behavior, such as saving for emergencies, saving for children's education, and planning for retirement, among households. We also find that the likelihood of goals-based savings behavior of moderately risk seeking households is positively associated with financial literacy. Although risk tolerance appears to be an important factor in the savings and investment decisions of households, the findings of this study provide further evidence regarding the role of financial literacy in improving household financial capability. Implications for policy makers, scholars, and researchers in the area of behavioral economics and household finance are included.

When Coca-Cola Grows Citrus on the Nile, Who Wins? Revisiting the Arab Boycott in Egypt

Andrew Jarnagin, CURO Summer Fellow
Dr. Shane Hamilton, History, Franklin College of Arts & Sciences

The Coca-Cola Company was barred from the Egyptian market in 1966 under the Arab boycott of Israel and firms conducting business with Israel. The company responded by mobilizing its influence in the American government to assist in negotiations. It succeeded in inking a deal in 1977, two years before Egypt officially ended its participation in the boycott altogether, whereby Coca-Cola agreed to invest $10 million ($39 million in today's dollars) in agriculture and factory infrastructure, insured by the U.S. government. However, in secret talks in 1975 with the U.S., Egypt had already agreed to end the boycott (thus allowing Coca-Cola to return) as a part of the peace deal with Israel. When Egypt allowed Coca-Cola to re-enter the country, it was facing a foreign exchange crisis as a part of larger economic woes. In the first decision to ban Coca-Cola and the second allowing it to return, economic circumstances rather than anti-imperialist ideology dictated Egypt's negotiating position, and it extracted a desperately needed inflow of foreign investment from Coca-Cola in exchange for a right to sell that it had already secretly negotiated away as part of an American-backed peace deal with Israel. These findings are based on analysis of internal Coca-Cola documents and U.S. State Department cables.

Understanding the Rise of the Sadrist Movement in Iraq

Andrew Jarnagin, CURO Summer Fellow
Dr. Kevin Jones, History, Franklin College of Arts & Sciences

When the Ba'th Party came to power in Iraq in 1968, Saddam Hussein spelled out the party's opposition to "sectarian, racism, and tribalism." By the mid-1990s, however, the Ba'th regime was itself a proponent of those three –isms, whether openly or indirectly. This study demonstrates that government policies promoting sectarianism, racism, and tribalism contributed to the rise of a populist social movement led by Muhammad Sadiq al-Sadr which endured past his assassination by the regime in 1999. Sadr took advantage of

Iraqi Shias' growing feelings of alienation due to state oppression to create a public space for expressing Shia religious identity; used Saddam's long-held desire to see an Arab cleric rather than one with "Persian" links leading the Shia religious establishment to quickly grow in influence, initially with government consent; and appropriated the regime's revival of tribal identity to build a parallel network of tribal support across central and southern Iraq. Analysis of internal Ba'th Party documents shows that the despite the image of Ba'thist Iraq as an all-powerful totalitarian state, the government felt unable to control the growth of Sadr's influence. While the regime assassinated Sadr after he began to publicly challenge government oppression, it was unable or unwilling to dismantle the movement's entire network, and Sadr's representatives remained active after his death. This study contributes to scholarship debating the totalitarian nature of Saddam's Iraq and also helps explain the rise of Muqtada al-Sadr, son of Muhammad Sadiq al-Sadr, as a major political and militia leader in Iraq today.

Education Level May Differentially Buffer Cognitive Decline in Older Adults Based on Race

Kharine Jean
Dr. Lloyd Stephen Miller, Psychology, Franklin College of Arts & Sciences

Although race and educational attainment have both been related to cognitive functioning in late life, the interaction of these two factors is surprisingly understudied. The aim of this study was to examine whether education level differentially buffers cognitive decline in Caucasian and African American older adults. Given that African Americans are at increased risk for cognitive decline due to a variety of socioeconomic and lifestyle factors, it was hypothesized that education level would confer greater advantage to African Americans relative to Caucasians during the cognitive aging process. A 2×3 analysis of variance was conducted on a sample of 580 older adults (mean age =69.9, 62.2% Caucasian) participating in the Family Relationships in Late Life Study with race (Caucasian and African American) and education (< high school, high school, and higher education and above) as the between-subjects factors. Cognition, as measured by the Repeatable Battery for the Assessment of Neuropsychological Status global score, served as the dependent variable. Consistent with previous findings, significant main effects indicated that African Americans [$F(1, 574)=49.09$, $p=<.001$] and individuals with less education [$F(2, 574)=78.74$, $p=<.001$] evidenced lower cognitive functioning. As expected, the interaction term reached statistical significance [$F(2, 574)=5.724$, $p=.003$]. Upon further analyses, the effect size of education on RBANS score for African Americans was .33 and .14 for Caucasians. Our findings suggest that African Americans gain greater benefits from educational attainment; and that education may have greater clinical significance among African Americans in preventing dementia, given lower overall levels of cognitive functioning in late life.

Expression of Inflammatory and Coagulation Factors in Syncytiotrophoblast BeWo Cells Exposed to *Plasmodium falciparum* Derived Hemozoin

Tiffany Jenkinson, CURO Graduation Distinction, CURO Research Assistant
Dr. Julie Moore, Infectious Diseases, College of Veterinary Medicine

Malaria is often considered a disease of the developing world, affecting more than 97 countries and an estimated 207 million people annually. Furthermore, children and pregnant women are a more susceptible population. High rates of maternal morbidity, as well as low birth weight and fetal loss, are attributed

to placental malaria (PM), a disease characterized by the accumulation of malaria infected erythrocytes in the intervillous space of the placenta, the invasion of inflammatory cells, and the release of pro-inflammatory mediators. While the specific immunologic mechanisms underlying the pathogenesis of PM are not fully understood, it is established that excessive fibrin deposition and an over-activation of inflammatory mediators are key components of the body's response to malarial infection. This study aims to investigate the progression of placental coagulopathy in a trophoblast choriocarcinoma cell line, known as BeWo. In order to mimic the pathological model of PM infection, BeWo cells were stimulated with stimulants such as lipopolysaccharide (LPS) and the *Plasmodium falciparum* by-product, hemozoin. Cellular mRNA levels were analyzed by quantitative PCR for possible upregulation of pro-coagulant factors, pro-inflammatory cytokines, anti-fibrinolytic factors, anti-coagulants, and pro-angiogenic factors. The underlying interrelation and corroboration of coagulation and inflammation is still not well understood. By gaining a deeper understanding of the role of coagulation and its relationship with inflammation in PM, we hope to provide insight into possible mechanisms of treatment or prevention.

Regulation of Base J Synthesis in Trypanosomes

Melissa Jennings, CURO Honors Scholar
Dr. Robert Sabatini, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Leishmania tarentolae (*L. tarentolae*) is a protozoan parasite that causes leishmaniasis, which affects people in parts of Africa, Asia, South America, and Central America. The Leishmania protozoa are part of a larger class called kinetoplastids which are responsible for deadly human diseases such African sleeping sickness in Africa and Chagas disease in South America. Research in the Sabatini lab is focused on a novel modified DNA base, called base J, that regulates RNA polymerase II transcription and gene expression in kinetoplastids. By understanding base J synthesis and function, researchers may one day be able to develop a specific treatment that will manipulate base J and kill these human pathogens. The initial step of J synthesis is catalyzed by two thymidine hydroxylases, JBP1 and JBP2, that somehow recognize specific regions of the parasite genome and modify a thymine base. Understanding the mechanisms involved in regulating the specificity of J synthesis in the kinetoplastid genome is essential to understanding epigenetic regulation of gene expression in the parasite lifecycle. Our hypothesis is that additional proteins are associated with JBP that direct the specificity of thymine modification genome-wide. My project has been to identify JBP associated proteins using tandem affinity purification of JBP1 and JBP2 in *L. tarentolae* followed by mass spectrometry. Utilizing this technique I have recently identified several potential JBP1 associated proteins. Characterization of these proteins is underway to determine their role in regulating JBP1 activity on chromatin in vivo and thus directing the modification of specific thymines in the genome.

Circulating Concentrations of Growth Differentiation Factor 11 Are Heritable and Correlate with Life Span

Zixuan Jiang
Dr. Robert Pazdro, Foods & Nutrition, College of Family & Consumer Sciences

Growth differentiation factor 11 (GDF11) is member of the transforming growth factor β (TGF-β) superfamily of proteins. Circulating GDF11 concentrations appear to decline with age, and its depletion is associated with cardiac hypertrophy and other morbidities. Knowledge of GDF11 regulation is limited,

and the effects of natural genetic variation on GDF11 levels are currently undefined. We tested whether genetic background determines serum GDF11 concentrations using two classical inbred mouse strains: C57BL/6J (B6) and BALB/cByJ (BALB). B6 mice exhibited significantly higher GDF11 levels than BALB mice, and these strain differences were consistent throughout the life span. Overall, interactions between age and genetic background determined GDF11 concentrations, which were unaffected by sex. We then surveyed a panel of 22 genetically diverse inbred mouse strains and discovered a sixfold range in GDF11 levels at middle age. We estimated that 74.52% of phenotypic variation in GDF11 levels was attributable to genetic background. We used the Mouse Phenome Database to screen for phenotypes that correlate with GDF11. Interestingly, GDF11 levels predicted median strain life spans. This study revealed high heritability of GDF11 levels. Furthermore, our correlative data suggest that GDF11 may serve as a novel predictor of mammalian life span. (Zhou, Y., et al. J Gerontol A Biol Sci Med Sci. In Press. doi:10.1093/gerona/glv308)

Feeding Choice Characterization of *Euptoieta claudia* and Oviposition Choice Analyses of *Agraulis vanilla* in Relation to Cyanide Production of *Passiflora incarnata*

Zehneel Jiwani, CURO Research Assistant
Dr. Rodney Mauricio, Genetics, Franklin College of Arts & Sciences

Cyanogenesis is the release of hydrogen cyanide stored in forms such as cyanogenic glycosides and cyanogenic lipids within the tissue of certain plants. This release of HCN is used as a defense mechanism by certain plant species in order to deter or poison herbivores from consuming the plant. Some herbivores, however, have adapted in such a way as to not only withstand the effects of HCN release but rather seek out plants based on the production of cyanogenic glycoside for the purposes such as feeding and survival. Experiments were conducted in order to evaluate the strength of the defensive mechanism of cyanogenic glycoside production in the Purple Passionflower (*Passiflora incarnata*) against herbivory of a generalist herbivore, the Variegated Fritillary (*Euptoieta claudia*). Further analyses of the relationship between cyanogenic glycoside production by the Passionflower and herbivores was evaluated by an experiment examining the oviposition preference of a specialist herbivore, the Gulf Fritillary (*Agraulis vanilla*), on varying genotypes of Passionflower.

The Effect of the Colonial Past on Women's Representation in the Caribbean

Kimberlee John-Williams
Dr. Maryann Gallagher, International Affairs, School of Public & International Affairs

This paper focuses on the Caribbean region and the effect that the colonial past has on women's representation today. This paper analyzes the influence of colonial history on women's representation by comparing Ibero and Anglo Caribbean countries. The Anglo Caribbean had a relatively peaceful transition from colonialism to independence and it was expected that this would translate into higher women's representation in legislature than the Ibero Caribbean. However, the data demonstrated that Ibero Caribbean countries elect women at a slightly larger margin than Anglo Caribbean countries. This paper presents a novel explanation for why this occurs, based on women's participation in nationalist revolutionary movements.

The Role of Auditory Skill Development in the Advancement of Vocalization Development

Breana Johnson, Alexis Pope, Mackenzie McGraw, Sherry Sayavongsa, Meredith Towey, Hayley O'Hara, Courtney Todd, Anna

Fink, Sabrina Williams, Chase Kranzlein, Brianna Kelley
Dr. Sandie Bass-Ringdahl, Communication Sciences & Special Education, College of Education

Research supports the effectiveness of early intervention in lessening the impact of hearing impairment on speech and language development. Recent advances in hearing aid and cochlear implant technology make an audible speech signal possible. Audibility of the speech signal is critical for the development of speech and language and is a primary goal of assistive technology. The relationship between early speech development and auditory skill development needs to be defined in clinically useful ways if such information is going to meaningfully contribute to the treatment decision making process. The purpose of the current study is to investigate if there is a minimum amount of auditory skill development necessary for the emergence of canonical babbling. Canonical babble is a milestone in vocalization development and is an indication of emerging first word production. The current study is a retrospective analysis of data from 7 children with normal hearing with an average age of 14.25 months (range 5-25.67 months). Auditory milestone behaviors were collected using the IT-MAIS (adapted) parent questionnaire. The early vocalization data were collected using the LENA device. The LENA is a small digital language processor worn by the child throughout the day to record up to a 16 hour language sample in a naturalistic environment. The data will be segmented and analyzed to determine degree of canonical babble emergence. The results will be combined with the results from a previous investigation of children with hearing impairment to better understand the relationship of auditory and early vocalization milestones.

Knockdown of IFT Proteins Phenotypically Affects Primary Cilia

Grace Johnson, CURO Graduation Distinction
Mary Abkemeier, Catherine Waldron, Daniel Blumenthal, Vivian Vu
Dr. Jonathan Eggenschwiler, Genetics, Franklin College of Arts & Sciences

The purpose of this project is to investigate ciliogenesis of the primary cilia. On a broad scale, these cilia have large implications in the fields of human disease and developmental biology. There is a wide spectrum of diseases called ciliopathies that are caused by problems with ciliary processes. The ciliary proteins we are investigating include intraflagellar transport (IFT) proteins, motors, and regulatory proteins that play a role in regulating the primary cilia. To investigate these proteins, we employed the CRISPR/Cas genome editing system and a loxP flanked transcriptional stop cassette to induce reversible mutations in target genes. The specific genes that we investigated were Atat1, Kif7, CCRK, IFT122, and Bbs8. Atat1 is α-tubulin acetyltransferase and a knockout is expected to result in slower intraflagellar transport by assembly proteins and a lack of alpha-tubulin. IFT122 is transport protein whose knockdown results in an accumulation of transcriptional mediators at cilia tips. Kif7 is a protein that regulates cilia length and structure. A knock out of Kif7 results in phenotypically longer cilia. Our research attempted to couple a Kif7 null with a CCRK null, whose phenotypic effects are unknown. Bbs8 encodes for Barbet Biedle syndrome protein 8. A mutation should result in improper cilia movement. These phenotypes are observations that have been made and reported in the literature. Our goal is to explain these phenotypes at the mechanistic level by observing the effects on the overall structure of cilia, the rate of transport, and the ability to transport cargo within the cilia.

Abstracts

Parentification as a Predictor of Emotion Dysregulation in Young Adults

Sara Johnson
Amber Madden, Graduate Student
Dr. Anne Shaffer, Psychology, Franklin College of Arts & Sciences

Parentification is a form of role-reversal within a parent-child dyad in which the parent looks to the child to act as his or her caregiver (Jurkovic, 1997); this disturbance of typical family-relationship boundaries is problematic when the demands placed on a child by the parent exceed developmental ability (Kerig, 2005; Sroufe & Fleeson, 1988). Parentification has been linked to poor social competence in childhood and worse college adjustment (Johnston, 1990; Hetherington, 1999). Peer attachment also predicts psychological well-being among adolescents; secure peer attachment is associated with increased well-being (Laible, Carlo, & Raffaelli, 2000). Based on this literature, we hypothesized that peer attachment would mediate the relations between childhood parentification and emotion dysregulation, given that disrupted parent-child relationships may impact the formation of healthy peer relationships, furthering the likelihood of dysregulated emotions in young adulthood. This study utilized data collected from a sample of 1654 undergraduate students (*M* age = 19.47; 71.4% female) through online surveys. Measures included a retrospective questionnaire of childhood parentification (PBS-III), current peer attachment, including subscales of trust, communication, and alienation (IPPA), and current emotion dysregulation problems (DERS). Consistent with hypotheses, peer trust and alienation were both significant mediators of the relations between childhood parentification and current emotion dysregulation (see Figure 1). These findings highlight the degree to which young adults are impacted by their relationships with the most important people in their lives: both parents and peers. Future research should explore the importance of peer attachment in associations between other childhood experiences and later psychosocial functioning.

Silencing in Chicana Literature: How Chicana Women Writers Navigate Marginalization in the Borderlands

Chandler Johnston
Dr. Dana Bultman, Romance Languages, Franklin College of Arts & Sciences

"*En boca cerrada no entran moscas*" is a well known Spanish saying, meaning "Flies don't enter a closed mouth." As Mexican Americans living in a hegemonic mainstream United States culture, Chicana women must navigate silencing in order to overcome marginalization and find agency and power. Silencing for Chicana women can occur through language, marginalization in the borderlands (living within the hybrid context of U.S., Mexican, and Mexican-American cultures and spaces), and the struggles of multiple "*mestiza*" consciousnesses. Ultimately, Chicana women often break through this silencing during coming-of-age narratives or use silence to their advantage as a form of agency. Using Gloria Anzaldúa's foundational Chicana text *Borderlands/La Frontera* as a theoretical framework, I investigate representations of silencing in more recent contemporary Chicana literature. Analyzing these narratives through a feminist lens, I argue that Chicana women use language, literary style, and strategic silence to find a voice amid the oppressive powers of both Mexican-American and U.S. cultures. Whether through more active or subdued feminist performance, Chicana women, facing issues of their intersectional identities that affect them through ethnicity, race, gender, class, and nationality, must struggle and survive through repressive settings. My paper studies these oppressions and reveals how current Chicana women writers represent how to

endure and thrive through outside silencing forces.

Quantitative PCR Detection of the SRY Gene of Male Dog Mesenchymal Stem Cells in Female Dog Brains with Experimentally Induced Ischemic Stroke
Susan Jones, Foundation Fellow
Dr. Elizabeth Howerth, Pathology, College of Veterinary Medicine

Intra-carotid-delivered mesenchymal stem cells (MSCs) may improve functional neurological outcomes after acute ischemic stroke (AIS). However, a large animal model is essential before beginning human clinical trials for patients with AIS. This study uses a dog stroke model in which female dogs with experimentally induced AIS receive male-derived MSCs via intra-carotid injection. It is hypothesized that the MSCs will successfully move to the site of infarction and participate in repair of damaged tissue. The objective of the present study is to target the Y chromosome in order to track the migration of the male-dog derived MSCs to various locations by using quantitative PCR. To detect the MSCs, a primer set was designed to amplify the SRY gene on the Y chromosome by qPCR. This technique was tested and optimized using male dog bone marrow. The qPCR technique was then tested using fresh brain samples from female dogs with experimentally induced AIS that were subsequently injected with male MSCs on the side of the stroke. This technique was effective at detecting the Y chromosome in the brain samples and is suitable for tracking male-derived MSCs in this dog model of stroke.

How do Middle School Students Define Sustainability? A Preliminary Analysis of Focus Groups
Usha Kaila
Dr. Jennifer Thompson, Crop & Soil Sciences, College of Agricultural & Environmental Sciences

This project aims to characterize how middle school students understand the concept of "sustainability." We highlight what domains of knowledge and experience students draw on to develop definitions of sustainability, and how they negotiate these definitions in a group setting. In order to impact students' attitudes and behavior around sustainability, it is essential to understand how they think about this issue. As part of a larger research project studying the impact of integrated sustainability programming at a local middle school, we have conducted focus groups with 6th graders (2 groups, with 4-6 students each). We are in the process of analyzing this data and will be conducting a second round of focus groups this spring. Preliminary analysis indicates that students' definitions are influenced by their experiences at home and at school, and focus on students' collective responsibility to make resources last.

Evidence-Based Interventions to Increase Wait Time and Decrease Problem Behaviors in Children with Autism
Megha Kalia, CURO Honors Scholar, CURO Summer Fellow, CURO Research Assistant
Dr. Kevin Ayres, Communication Sciences & Special Education, College of Education

Participants in this study include two children with autism who display varying degrees of aggression, non-compliance, or self-injurious behavior (SIB) when waiting to request for items. The purpose of this research is to decrease the quantity of their problem behaviors and to increase the children's waiting time when waiting to request for items. A picture exchange system will be used within a changing criterion design to systematically increase wait time before the item is available. The function of a picture exchange system is to provide children with

communication deficits with another mode of communication using photographs.

The Effects of Two Different High-Fat Diets on Appetite

Fatima Kamal
Dr. Jamie Cooper, Foods & Nutrition, College of Family & Consumer Sciences

Studies show that eating a single meal rich in poly-unsaturated fats (PUFAs) results in greater fullness compared to a meal rich in mono-unsaturated fats (MUFAs). Purpose: Determine the effect of a high-fat diet rich in either MUFAs or PUFAs on feelings of hunger and fullness. The study used a randomized, cross-over design consisting of 2 trials that were each 10 days. Seven adult males (age 18-45) were recruited. Each 10d trial consisted of a 3d lead-in diet, two 9h testing visits, and a 5d intervention diet. During the 5d diet, subjects received meals enriched with either cottonseed oil (high in PUFA) or olive oil (high in MUFA). The diets were 50% fat, 35% carbohydrates, and 15% protein. During each 9h testing visit, subjects received a breakfast and lunch meal, high in the fat designated for that trial. Subjects completed Visual Analogue Scale (VAS) questionnaires to rate feelings of hunger and fullness before and every 30-min following the two meals. There was no difference in fasting hunger or fullness VAS scores from pre to post PUFA or MUFA diets. Postprandial area under the curve was not different from pre- to post-diet for hunger in MUFA (pre:314.1±41.7, post:308.4±35.3, p=0.9) or PUFA (pre:351.4±61.1, post:326. 9±43.1, p= 0.7). Fullness was also not different pre- to post-diet in MUFA (pre:414.7±62.6, post:399.1±64.8, p=0.8) or PUFA (pre: 412.8± 64.2, post:391. 9±67. 9, p= 0.8). High fat diets rich in either MUFA or PUFA did not have an effect on feelings of hunger or fullness in adult men.

Finding Optimal Designs Using Genetic Algorithms

Andrew Kane
Dr. Abhyuday Mandal, Statistics, Franklin College of Arts & Sciences

In order to extract meaningful information from experimental data, the experiment needs to be designed carefully. Practitioners often use statistically optimal designs for conducting such experiments. With the advent of modern technology, sometimes the experiments have different constraints and it may be difficult or impossible to obtain such designs theoretically. We propose using numerical algorithms for obtaining such designs. Genetic algorithms, which find optima using search algorithms based on natural gene transmission, mutation, and fitness, have been applied successfully to various fields requiring numerical solutions. We examine their effectiveness in finding optimal experimental designs under different situations and demonstrate that they find good designs successfully based on various optimality criteria.

Age Related Metabolism of Pyrethroids in Rat Brain Microsomes

Marshall Kastens
Dr. Catherine White, Pharmaceutical & Biomedical Sciences, College of Pharmacy

Pyrthroids are commonly used insecticides and insect repellants that are known to exert neurotoxicity. The objective of this project is to determine if the toxicity is age-dependent since children (1-3 yrs) have higher exposure risks than adults. Preliminary studies have shown that 15- and 21-day-old rats have higher brain levels than adults; however, while adult brain concentrations remain high, the levels in younger rats decrease at a faster rate. To understand these dispositional differences in brain the role of brain metabolism must be examined. Pyrethroids are metabolized by carboxylesterases and cytochrome P450 which

are both found in brain tissue. However, very little information is available regarding age-related maturation of these enzyme systems in the brain. Brain homogenates and microsomes will be used to explore the possible age-dependent metabolism of pyrethroids. Brains will be harvested from day 10, 15, 21, 30, 40 and 90 day-old rats and pooled. Tissues will be homogenized and microsomes made using standard methods. Deltamethrin, cis-permetrhin, trans-permethrin and cis/trans permethrin will be incubated at 37C with brain homogenates (carbocylesterase + Cytochrome P-450) and microsomes (cytochrome P-450) and loss of parent compound will be monitored by HPLC or GC/MS. Data will be analyzed with WinNonlin/Prism. The results of these studies will determine if there is an age-related difference in the metabolic capacity and/or binding affinity with pyrethroids and cytochrome P-450/carboxyesterase enzymes.

O-Linked Glycosylation Patterns of Cervical Mucins in HIV Infection

Hammad Khalid, Foundation Fellow
Dr. Michael Tiemeyer, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Mucosal surfaces, well known for their role in sensing their environment (nose, mouth), nutrient absorption (gut), gas exchange (lungs), and reproduction (vagina and uterus), also function as a complex immunological barrier at these common sites of entry for pathogens and viruses. However, surprisingly little is known about the complex post-translational modifications of the mucin proteins expressed at these surfaces and about how these modifications provide protection. This project focuses on an in-depth characterization and comparison of the glycans found on cervical mucins from HIV and non-HIV patients aimed at identifying unique modifications that may play a role in mucosal immunity. Samples were collected and prepared to analyze by direct injection nanospray ionization mass spectrometry (NSI-MS). Glycan structures were probed using collision induced disassociation (CID) and assigned using software developed in-house for high-throughput analysis. Experimental data obtained suggests a decrease in sialylated and fucosylated structures and a decrease in sulfated O-linked glycan structures in HIV patients indicating a possible defect in terminal glycan processing. Additionally, data from lectin blots indicate a decrease in the abundance of anti-inflammatory mucins in non-HIV patients. By understanding the fine structural features of the mucosal interface, new approaches for eliciting mucus-tethering antibodies can be considered. Additionally, this research has the potential to develop a more efficient, standardized platform for evaluating the mucus barrier, which could enhance future research on natural and vaccine-induced defenses against other sexually transmitted infections.

Investigating the Post Translational Modification of CaaX Proteins

Haeun Kim
Dr. Walter Schmidt, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Many neurodegenerative diseases are associated with aggregation of proteins into amyloid plaques due to defects in protein modification. Examples of such diseases include Alzheimer's and progeria. Hsp70 and DnaJ/Hsp40 are co-chaperones that serve to facilitate protein translation, modification, translocation, and destruction. More specifically, within the family of DnaJ/Hsp40 proteins lies a group of CaaX proteins that are characterized by their highly conserved four-amino acid sequence at the carboxyl-terminus. A recent observation by the Schmidt lab directly contradicts what was previously understood in

literature regarding Caax proteins. It was previously understood that all proteins with the CaaX motif follow a strict 3 step model of post-translational modification. It is now known, through the experimental investigation using genetic and microbiological approaches involving the yeast system, that the Ydj1p CaaX protein does not follow this traditional scheme. Ydj1 is a DnaJ family protein that is hypothesized to only go through the first step of the modification pathway rather than all three. This study further investigates the possible cause for the difference in post-translational modification associated with Ydj1p by using S. cerevisiae. Approaches to study this phenomenon involve mutations of the CaaX motif and genetic assessment of a Ydj1p-dependent thermotolerance phenotype.

A Computer Program for Planar Truss Analysis

Sokngim Kim, CURO Research Assistant
Dr. Siddharth Savadatti, College of Engineering

Trusses are some of the most efficient load carrying structures that are extensively used in the design and construction of physical infrastructure like bridges, housing, and power transmission towers. This project discusses the development of a computer program for analyzing planar trusses. The inputs for this program are loads, sizes of members, material properties, and truss geometry. The outputs are support reactions, member forces, deflections, and the deformed shape of the truss. This program can be used to analyze trusses of varied geometry quickly and allows the user to choose the most optimal truss design manually. Further development of this program will support the automatic determination of optimality.

Diet-Induced Obesity Differentially Regulates Glutathione Homeostasis in C57BL/6J, BALB/cByJ, and AKR/J Mice

Stephanie King, CURO Graduation Distinction
Dr. Robert Pazdro, Foods & Nutrition, College of Family & Consumer Sciences

Cellular metabolism generates free radicals and other reactive oxygen species (ROS), and accumulation of these molecules disrupts homeostasis and drives oxidative damage. The endogenous antioxidant defense system detoxifies ROS and confers cellular protection against stress, and the ubiquitous tripeptide glutathione (GSH) coordinates many diverse mechanisms within this system. Higher GSH concentrations and redox status (GSH/GSSG) are therefore associated with augmented cellular defenses and stress resistance, while lower levels reflect oxidative stress and disease. Tissue GSH concentrations and GSH/GSSG are highly heritable in humans and mice, and interactions between genetics and diet appear to regulate these traits in model organisms. Currently, the dietary components that intersect with genetic background to regulate GSH homeostasis are not completely defined. In this project, we tested the hypothesis that dietary fat regulates tissue GSH homeostasis in a manner dependent on genetic background. To characterize these effects, GSH levels and GSH/GSSG were quantified in tissues from C57BL/6J (B6), DBA/2J (D2), and AKR/J (AKR) mice fed a control or high-fat diet for 12 weeks. Diet-induced obesity caused an increase in renal GSH/GSSG in B6 mice only. D2 mice fed a high-fat diet exhibited an increase in hepatic GSSG concentrations and a decrease in GSH/GSSG, while the livers from other strains were unaffected. Diet-induced obesity did not alter the GSH system of AKR mice in either tissue. In all, these data indicate that high dietary fat and subsequent diet-induced obesity regulate GSH homeostasis in a strain-dependent manner. Future studies will clarify the mechanisms by which genotype and diet-

induced obesity interact to control the cellular antioxidant system.

Effects of Cognitive Reserve and MPOD Levels on Personality in Older Adults

Evan Knox, Ramsey Scholar
Dr. Lloyd Stephen Miller, Psychology, Franklin College of Arts & Sciences

Previous research has established both cognitive reserve and the five-factor traits of personality as impacting cognitive impairment in older adults. The early determinations of cognitive reserve and theories as to cognitive reserve's physical meaningfulness both support a potential relationship between cognitive reserve and the five-factor personality traits. This relationship may be altered by levels of lutein in the brain over a long period of time. The results of any such analysis could provide insight into the physical manifestations of cognitive reserve, and also establish how cognitive reserve's effects on aging and cognitive impairment are mediated by personality. The authors performed a regression analysis between 2 proxy measures of cognitive reserve and the gender-accounted NEO-FFI scores for a sample of older adults (n=58, ages 64-92). Several multiple regression and moderation analyses were performed using cognitive reserve proxies and several macular pigment optical density (MPOD) readings (460 nm, 490 nm, and average) in a smaller sample (n=40, ages 64-92). Both proxy measures were found to be significantly positively related to openness (p=.002, p<.001) alone. For the average MPOD levels, both proxies demonstrated significant positive moderation effects with conscientiousness (p=.017, p=.005). While the lack of a cognitive reserve – neuroticism relationship is unexpected, the cognitive reserve – openness relationship confirms our expectations. The relationship between MPOD, cognitive reserve, and conscientiousness presents new information that must be further examined for replicability, but could provide new insights into the physical meaning of cognitive reserve.

Response of *Helianthus annuus* Biomass to Nutrient Stress

Ellen Krall, CURO Research Assistant
Dr. Lisa Donovan, Plant Biology, Franklin College of Arts & Sciences

The cultivated sunflower (*Helianthus annuus)* is an important oil and food seed crop throughout the world. Both intensive cultivation of sunflowers in developed countries and low-input methods of cultivation in developing countries would benefit from nutrient stress resistant cultivars of sunflower that perform optimally under low nutrients. The ultimate goal of this experiment is to identify which of twelve previously identified genotypically diverse strains of *Helianthus annuus* L. perform similarly under low nutrient stress as they do in an optimized nutrient setting, and determine what characteristics could have contributed to their improved response. Three replicates of each strain (total n = 153 plants) were grown in four levels of nutrients and harvested at the seedling stage while three additional replicates (total n = 308) were grown in eight levels of nutrients and harvested at the budding stage. Evaluation of data from seedling harvest suggests that lines PPN027 and PPN240's pronounced allocation of biomass to roots at low nutrients may contribute to their more uniform growth across nutrient levels. Data are currently being collected and analyzed for sunflowers harvested at the budding stage, but it is reasonable to assume the same patterns, perhaps more defined, in terms of biomass allocation will be observed and data may also unveil other strains that perform well over a longer period of time.

Identifying Genetic Suppressors of ZYG-11

James Kraus, CURO Graduation Distinction, CURO Research Assistant
Dr. Edward Kipreos, Cellular Biology, Franklin College of Arts & Sciences

The ubiquitin-proteasome pathway is a process for targeted protein degradation. The protein substrates include cell cycle-related proteins that need to be degraded in a timely manner to allow proper cell cycle progression. In this pathway, the protein targets are marked for degradation by addition of a poly-ubiquitin chain, which acts as a signal for the proteasome. Cullin-RING ligases (CRLs) are a class of protein complexes that target proteins for poly-ubiquitination. The different substrate recognition subunits (SRSs) provide the specificity for the protein substrates of the CRLs. CRL2/ZYG-11 is a CRL complex that uses ZYG-11 as the SRS. Our lab has showed that CRL2/ZYG-11 is required for the meiotic metaphase II to anaphase II transition in *C. elegans*. There are many *zyg-11* mutant phenotypes including defects in chromosome condensation, polarity and cytoplasmic organization. The goal of my research is to further understand the role of CRL2/ZYG-11 in these cellular processes by identifying its substrates. Currently we are identifying *zyg-11*(ts) suppressor mutations by positional cloning of mutants, whole genome sequencing, and RNA interference of candidate suppressor genes.

Analysis of Pancreatic Cancer Biomarkers

Anjali Kumar, CURO Honors Scholar
Dr. Lance Wells, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Of all cancers, pancreatic cancer has the lowest survival rate. The high mortality rate, due to lack of diagnostic tests, has created an important role for pancreatic cancer researchers to change these statistics through discovering more efficient methods for detecting pancreatic cancer. We study pancreatic ductile fluid and patient serum samples which contain proteins and sugars that aid in finding early diagnostic biomarkers. Pancreatic ductile fluid contains pancreatic cancer biomarkers that can be detected by glycoproteomic approaches. Due to the invasiveness of drawing pancreatic ductile fluid from patients, we are studying patient serum as a means to identify proteins. Immunoblotting analysis is used on serum samples from pancreatic cancer and pancreatitis patients to compare the conditions of serum, using pancreatitis as a control condition. Prior to conducting immunoblotting techniques, serum samples are normalized through a cleanup of albumin and IgG. Western blotting techniques are used to identify the level of protein changes present between the two conditions as well as to observe potential shifts in bands due to glycosylation. Target proteins for western blot analysis include pancreatic amylase, pancreatic lipase related protein 2, phospholipase A2, REG family proteins, Elastase 3B, and GP2-1. We are currently undergoing procedures in analysis of the proteins of interest; evaluation of the results will provide insight into the strength and correlation of biomarkers with either condition. The findings may be used to develop an early detection, non-invasive assay to identify biomarkers for pancreatic cancer more efficiently and increase the survival rate of pancreatic cancer patients.

The Impact of Blood Circulation on Cancer Metastasis Patterns

Jason Kwak, CURO Research Assistant
Dr. Ying Xu, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Cancer metastasis is a process of cancer cells spreading throughout the body, and building new colonies in organs that are distant from the original location of the primary tumor. The tumor microenvironment is defined by the interaction between molecules around a tumor and the normal cells, and its study is significant in understanding the process of

tumor progression, and the mechanism behind metastasis. Noting that cancer metastasis occurs in the venous system, in our research, we are interested in how the blood circulation system has an impact on the metastatic patterns of primary cancer. Therefore, we studied the correlation between blood circulation rate and metastatic distribution of different primary cancers by using Spearman's rank correlation. 4012 autopsies of 40 primary cancers and 30 metastatic sites from five medical centers were used, and the blood circulation data for 14 normal organs were obtained from literatures. Our study has shown that the lungs had the highest Spearman's correlation value of 0.6073 between the rate of metastasis to each distant organs and the organs' blood circulation amount, and the p-value of 0.01 was highly significant to state that lung cancer evidently preferred to metastasize to sites with abundant blood circulation. On the contrary, some cancer type such as retro-peritoneum showed a significant negative correlation. These suggest different primary cancer type expresses different preference towards sites with abundant blood circulation, and further studies are needed to improve our understanding of the role that blood circulation rate poses in cancer metastasis.

Xenophobic Ants: Social Form Discrimination in the Tropical Fire Ant

Kip Lacy, CURO Summer Fellow
Dr. Ken Ross, Entomology, College of Agricultural & Environmental Sciences

Elucidating the genetic components of animal social behavior continues to be a biological holy grail. Fire ants have become a model system in which to explore the intricacies of social behavior. They exhibit the highest level of animal sociality—eusociality—and are often socially polymorphic within species. This is the case with the Tropical Fire Ant, *Solenopsis geminata*, in which there are two social forms: monogyne (single queen colonies) and polygyne (multiple queen colonies). The factors that maintain these two social forms sympatrically are unknown, however. In this study I investigated the interaction between workers and queens across different social forms and sites of origin by conducting behavioral choice assays for queen acceptance or rejection. I found that polygyne workers rejected all queens not from their site of origin, regardless of social form. Since ants presumably recognize each other on the basis of genetically determined pheromones, this inability to recognize such closely related conspecifics as kin may indicate unusual reproductive modes in the polygyne social form.

Effect of Strategic Marketing on Healthier Vending Machine Sales

Annie Ladisic
Dr. Leann Birch, Foods & Nutrition, College of Family & Consumer Sciences

Rationale: Regardless of the overwhelming evidence that consuming excess calories can contribute to obesity and chronic diseases, low-calorie snack options are not prevalent in most college campus vending machines. Even when offered, these items are frequently out-purchased by consumers in favor of higher calorie snack options. The use of strategic marketing to effect change in purchasing, encouraging consumption of lower calorie snacks, could help reduce the overall caloric intake of vending machine consumers. *Objective:* This study examines the effects of implementing a message spotlighting the "healthy" vs. "unhealthy" rows of products in a Dawson Hall vending machine. *Methods:* Rows 1 and 2 were stocked with "unhealthy" products that contained between ~250-500 kcal/package. The third row was stocked with "healthy" products, all ≤ 200 kcal. Sale data was collected over 12 weeks. A nutrition intervention sticker was installed on the machine during weeks 5–9, emphasizing high calorie (Rows 1 and 2) vs. low calorie (Row 3)

options. Three weeks of post-intervention data was collected to reveal whether the presence of the sticker had enduring effects on sales. *Results:* Using baseline data gathered in the initial 5 weeks of the study, I will compare the purchase choices of consumers prior to the intervention stage to those during, as well as after the intervention. I anticipate that during the intervention weeks, the product sales for Rows 1 and 2 will decrease, while sales of Row 3 items will increase. Following the intervention phase, I expect for sales to return to slightly below pre-intervention counts.

Super-Resolution Microscopy vs. Epifluorescent Microscopy of Aurora Kinase C and SYCP3 Localization in Mouse Oocytes and Spermatocytes

Ashley Lall
Dr. Rabindranath De La Fuente, Physiology & Pharmacology, College of Veterinary Medicine

Being able to more closely examine cells on the molecular level is becoming increasingly important to researchers in order to understand the complex pathways and interactions that occur during meiosis. Unveiling information about these interactions is extremely critical in order to understand problems that occur during pregnancy and reproduction which will hopefully remedy long-lasting issues that often result in pregnancy loss and genetic mutations in surviving embryos. The purpose of this experiment is to analyze two chromatin remodeling proteins that are essential for proper chromosomal division to occur during meiosis. Aurora Kinase C is primarily localized at the centromeres of mouse oocytes, and Synaptonemal Complex Protein 3 (SYCP3) is localized along the cohesions between homologous chromosomes in the lateral position of each chromosome. This experiment will specifically be studying lymphoid specific helicase wild type mouse oocytes and Trichostatin A-treated mouse spermatocytes. Epifluorescent microscopy, a common method of imaging chromosomes, is used in this report. However, advances in technology have allowed super-resolution microscopy to yield higher-resolution imaging of chromosomes. Super-resolution microscopy will allow the observation of Aurora Kinase C and SYCP3 on a molecular level in the mouse germ cells with hopes of uncovering more information about the roles of both Aurora Kinase C and SYCP3 during meiosis. The primary goal of this report is to compare and contrast the two microscopy methods, epifluorescent microscopy and super-resolution microscopy, and discuss the relative strengths and weaknesses of using each microscopy method.

Efficient Cloning by Temperature Upshift

Paige Lane
Dr. Cory Momany, Pharmaceutical & Biomedical Sciences, College of Pharmacy

Traditional cloning methods use restriction endonucleases, which are enzymes able to recognize and cleave specific DNA sequences within a plasmid. Ligases are then used to glue the cleaved products together in a second step. In routine cloning, purification of the insert and plasmid and then a selection or screening process (*e.g.* blue-white screening) is necessary for identifying appropriate clones. This complicated process is due to inefficiencies in the overall cloning reactions that result in vectors that lack inserts and low transformation numbers. A streamlined cloning method (Galloway *et al.*, 2013) utilizes only one restriction enzyme, an enzyme that cuts outside its recognition site, and concurrent ligation at room temperature. Introduction of a temperature upshift (from room temperature to 50°C) appears to be very effective in reducing the background of incorrect products. The ligase is inactivated at 50°C, while the restriction endonuclease cuts empty vector. Most restriction endonucleases

are used at 37 °C, a temperature in which the ligase is still active. The goal of this project is to identify restriction enzymes that are compatible with temperature upshift (e.g., are stable at 50°C in the time frame of the upshift). Endonucleases will be evaluated for their cutting efficiency at 50°C. The use of a blunt-end cutter with ligase and a temperature upshift results in very efficient cloning that does not require significant screening of clones. The results of this project have wide application to the standard genetic engineering methods used in research laboratories.

Examining the Antioxidant Properties of Hops

Caroline Langley
Dr. Erik Hofmeister, Small Animal Medicine & Surgery, College of Veterinary Medicine

Hops, used most commonly in brewing beer, contain the powerful flavonoid Xanthohumol. The only way to access this compound is through the consumption of beers. Though this compound has been proven as a potential longevity-increasing compound, there is little known about it. Xanthohumol inhibits the metabolic activation of harmful carcinogens, and can help eliminate free radicals in the human body that have been shown to cause cancer. The purpose of this study is to determine if hops teas can compete against commonly consumed teas in terms of antioxidant content. The hypothesis of this study is that a hops strain with a high alpha acid content will have an equal or greater phenolic content than most herbal teas. To do this, 20 strains of Hops with different alpha acid contents will be analyzed for antioxidant content via Total Phenolic Content and Ferric Reducing Ability of Plasma (FRAP) tests. Different times will be applied to each strain, consistent with beer brewing times. The FRAPS and phenolics values obtained in the lab will be compared to those of other commonly consumed teas, such as chamomile and green. With these values, we will be able to compare how Hops tea may affect oxidation as compared to other herbal remedies.

A Retrospective Study Analyzing the Relationship between Blood Coagulation and Liver Shunts

Caroline Langley
Dr. Erik Hofmeister, Small Animal Medicine & Surgery, College of Veterinary Medicine

In veterinary medicine, when canine patients are diagnosed with liver shunts, they are often given blood coagulation tests. The correlation between the two may not be as strong as believed. The purpose of this study is to determine if running blood coagulation tests on patients with post systemic shunts is a worthwhile endeavor both financially and medically. The hypothesis is that in most cases it is not beneficial to run blood coagulation tests. The results were obtained by cross analyzing medical cases and comparing recovery rate. Abnormalities in the coagulation tests were gathered in patients with liver shunts, with fewer the abnormalities corresponding to a decreasing need to run the tests. This study used cases from the past five years.

Experimental Evolution and Sperm Precedence in *D. recens* and *D. subquinaria*

Thomas Layman, CURO Graduation Distinction, CURO Research Assistant
Dr. Kelly Dyer, Genetics, Franklin College of Arts & Sciences

This study investigates the dynamics of speciation between two closely related fruit fly species. *Drosophila recens* and *Drosophila subquinaria* are found across northeastern N. America and northwestern N. America respectively. Their ranges overlap in the Canadian Rockies. Female *D. subquinaria* from populations that overlap with *D. recens*

discriminate against mating with *D. recens* males, whereas *D. recens* females from this region do not discriminate strongly against mating with *D. subquinaria* males. This presentation will discuss the results from two experiments. First, we will discuss an experimental evolution study that aimed to test whether a population of *D. recens* females subject to very strong selection against hybridization will acquire the ability to discriminate against mating with *D. subquinaria*. Second, we will discuss an experiment that tests for post-mating selection against *D. subquinaria* sperm in the female *D. recens* reproductive tract.

Effects of Mitochondrial-Targeted (MitoQ) Antioxidants on the Lipidome of a Transgenic Mouse Model of Alzheimer's Disease

Thao Le
Dr. Brian Cummings, Pharmaceutical & Biomedical Sciences, College of Pharmacy

Alzheimer's disease (AD) is a neurodegenerative disorder that causes deterioration in memory and thinking skills. It is the sixth leading cause of death in America, and experts estimate that there are over 5 million Americans with AD. Given the considerable evidence implicating the role of oxidative stress and mitochondrial dysfunction in AD, antioxidant compounds have been targeted as therapeutics. MitoQ (mitoquinone mesylate), is a drug candidate that easily crosses the blood-brain barrier to reach the site of formation of most reactive species, the mitochondria. In this study, we used lipidomics to assess the effect of MitoQ on the blood and brain lipid profiles of AD-transgenic mice. Phospholipids were extracted using the Bligh-Dyer method from whole blood and hippocampi of 13-month old and 18-month old 3xTg female mice treated with 100mM MitoQ via drinking water for 5 months prior to blood collection. Lipid phosphorus content was quantified using the Bartlett inorganic phosphorus assay. The samples were analyzed using electrospray ionization-mass spectrometry (ESI-MS), and principal component analysis (PCA) was performed. PCA analysis demonstrated distinct differences in lipid profiles across 13- and 18-month old mice based on age as well as MitoQ treatment. The lipidome of both age groups demonstrated alterations in glycerolipids, and the majority of changes were detected in 18-month old mice treated with MitoQ. Diacylglycerol and triacylglycerol lipid species decreased along with several phospholipid classes such as phosphatidylcholine and phosphatidylserine. These data indicate a potential effect of age as well as MitoQ on the lipidome within an AD mouse model.

Fractionation and Analysis of Wild Type and Galacturonosyltransferase 14 (GAUT14) Knockdown Switchgrass Cell Walls to Determine the Structure Synthesized by GAUT14

John Lee
Dr. Debra Mohnen, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Researchers have made progress in understanding plant cell wall structure and function. However, much remains to be learned about wall biosynthesis and fine-scale wall structure. Pectin is a major cell wall polysaccharide that provides structural support to the plant, is important in cell signaling, and binds adjacent cell walls together. Galacturonosyltransferases (GAUTs) are enzymes that synthesize the cell wall glycan pectin. In the model plant *Arabidopsis thaliana*, there are 15 GAUT genes which have either proven or putative pectin biosynthetic activity. Switchgrass is a biofeedstock crop being studied as a source of biomass for biofuel production. Modification of the expression of GAUT14 in switchgrass can potentially increase the quality of this

feedstock for biofuel production. The goal of this study was to determine the structural differences between cell walls from six GAUT14-knockdown (KD) lines compared to WT switchgrass. Cell walls from wild-type and the KD lines were extracted using solvents of increasing severity. The yield differences between the extracts from wild type and the knockdown lines were measured and will be discussed in regards to GAUT14 function. Such data also provide base-line data regarding possible ultrastructural changes in the cell walls of GAUT14-KD plants compared to the wild type. The cell wall fractions from the KD and WT lines are also being analyzed by glycome profiling, monosaccharide composition analysis, and linkage analysis. The goal is to identify which wall polymer(s) GAUT14 synthesizes and to determine which ones are modified in the GAUT14-KD switchgrass lines.

The Effect of Supplemental Vitamin E Form on Blood Oxidative Stress Parameters Measured in Exercising Horses

Kendall Lee
Dr. Kylee Duberstein, Animal & Dairy Science, College of Agricultural & Environmental Sciences

Vitamin E is a component of the antioxidant system of the horse and is commonly included in commercial horse feeds in the form of synthetic alpha-tocopherol acetate. The purpose of the research was to test the effect of supplemental vitamin E form on blood oxidative parameters in exercising horses. The project utilized 16 horses previously housed on pasture. Horses were kept in stall confinement for the duration of the study with 2–4 hours of dry-lot turnout per day. The horses underwent a two week "wash-out" period in which horses were fed a low vitamin E diet with no supplemental vitamin E. Following the wash out period, horses began a two week feeding trial where they were fed the same diet plus 4,000 IU/day of supplemental vitamin E. Horses were randomly assigned to one of the following supplementation groups: synthetic acetate powder, natural acetate powder, micellized d-alpha-tocopherol (liquid), and micellized d-alpha-tocopherol (powder). At the completion of the feeding trial, horses began a two day standard exercise regime. Whole blood and serum were collected four hours post supplementation prior to exercise on the first day and four hours following completion of the standardized exercise test (SET) on the last day. SET protocol was conducted by free lunging in an enclosed round pen at controlled and incrementally increasing speeds. Pre and post exercise serum was analyzed for alpha-tocopherol. Whole blood was analyzed for reduced, total, and oxidized glutathione to assess exercise induced oxidative stress.

Investigations of Chromium Photocatalyzed Cycloadditions

Sang Min Lee, CURO Research Assistant
Prof. Eric Ferreira, Chemistry, Franklin College of Arts & Sciences

Photocatalysis is an emerging area in modern organic synthesis which allows previously inaccessible transformations to be achieved using readily available visible light as an energy source. As of now, Cr photocatalysts have been employed in the radical cation Diels-Alder reaction of electron-rich dienophiles. In this transformation, the electron-rich alkene is rendered electron-poor after single electron oxidation by the catalyst, allowing it to cyclize with the diene. Electron-poor dienophiles have also been employed in this net [4+2] reaction, but because the Cr complexes are not strong enough to oxidize the electron-poor alkene, current research in the lab promotes the idea that it reacts with the diene through a different pathway. Experimental evidence suggests a light-mediated [2+2]-cycloaddition, followed by a

Cr-catalyzed vinylcyclobutane rearrangement. Importantly, this rearrangement yields the net [4+2] product with reversed Diels-Alder regioselectivity. Although a powerful transformation, a limitation of this reaction was that the electron-poor alkene had to be substituted with an electron-rich arene in order for the vinylcyclobutane rearrangement to occur. The possibility of a substrate where the dienophile was tethered by an additional alkene would also undergo the cycloadditions was considered as the proposed products would allow for further structural modification. Two variations of the tethered alkene dienophile substrates with electron-withdrawing substitutes were studied. Neither variation yielded the expected net [4+2] addition product, showing further limited restriction of the Cr catalyst transformation. The research suggests that the cycloaddition with the inclusion of this additional alkene section is not possible with solely the Cr catalyst.

Foreign Aid: Helping or Hurting Democracy?

Benjamin Leigh, CURO Graduation Distinction, CURO Research Assistant
Dr. Andrew Owsiak, International Affairs, School of Public & International Affairs

Does foreign aid foster democratization—either globally or specifically within Africa? There are conflicting arguments and evidence over the answer to this question. Some scholars maintain that foreign aid hinders development by encouraging corruption and propping up ineffective leaders. They note that although aid can promote democratization in democracies, it often does the opposite in autocracies. In contrast, others find evidence that aid can support and encourage viable opposition parties, improve the strength of an independent media and civil society, and elevate quality of life for citizens. Finally, some scholars strike a middle ground, stating that the attachment of conditions—such as permitting opposition parties or funding specific development projects—to foreign aid can help encourage the development of democracy. What many researchers overlook, however, is the role of intervening factors that may influence the foreign aid- democracy relationship by altering state and leader preferences. This paper therefore re-examines the relationship between foreign aid and democracy, with particular attention to the factors that may impact the effectiveness of foreign aid in encouraging democratization. In the end, I find that there is no cut and dry verdict on aid's efficacy. Instead, a combination of factors, including natural resource wealth, opposition party strength, and respect for human rights unite to impact if and how foreign aid engenders democratization.

Analysis of Surfactant Patterns Induced by Carbon Nanotube Arrays

Christopher Lenear, CURO Research Assistant
Dr. Xianqiao Wang, College of Engineering

As the interest in nanofluidic and nanostructural devices grows, there is an increasing need for nanoscale fabrication techniques that are both accurate and reliable. One novel strategy includes the patterning of block copolymers that can be degraded under ultraviolet radiation, resulting in channels or cracks on surfaces. In this project, we aim to study how carbon nanotubes can be strategically located on surfaces to generate a desired self-assembled pattern of surfactants using coarse-grained molecular dynamic simulations. This may provide a robust design strategy for many devices used for biosensing, electronics, purification techniques, and chemical separations for technology such as lab-on-a-chip and nanocapillary array membranes. By designing a variety of carbon nanotube patterns and studying the effects they have on the organizations of surfactant solutions, we can propose an algorithm to

produce many desired nanostructures. This study will offer an affordable method for creating unique self-assembled surface patterns from surfactant and thereby aid in the progression of many biological and electrical applications.

Far Red LEDs Effect on the Morphology and Flowering of Marigolds
Mary Lewis, CURO Research Assistant
Dr. Marc van Iersel, Horticulture, College of Agricultural & Environmental Sciences

Better control over the growth and development of greenhouse crops can help growers increase profits. Control over when plants flower is especially important. Far-red light is known to be important in triggering flowering responses of many plants. Our objective was to determine whether far-red light from LEDs can make marigolds flower faster. Marigolds (*Tagetes erecta*) typically flower fastest when exposed to long nights. We also wanted to determine whether far-red light affects plant morphology, including height and leaf size. Each day, marigolds were exposed to 16 hours of light and 8 hours of dark, simulating summer time. At the start of the dark period, plants received 0, 15, 30, or 60 minutes of far red light. All other growing conditions were kept as similar as possible. Plants that did not receive far-red light flowered later (~104 days) than those in any of the other treatments (~76 days). Plants that did not receive far-red light were 30 cm tall compared to a height of 87 cm for those exposed to far-red light. Plants grown without far-red also had smaller leaves than those in far-red treatments. Our results show that growers can speed up flowering of marigolds with far-red LEDs, while also producing larger plants. The amount of far-red light required is very low, which makes practical applications easy and cheap.

Conjugated Polymers
Xueying Li, CURO Research Assistant
Dr. Jason Locklin, Chemistry, Franklin College of Arts & Sciences

Organic photovoltaic devices have been made, but the thickness is hard to control. In our lab, we are synthesizing different conjugated polymers and grafting them onto various substrate surfaces to form polymer brushes using SI-KCTP (surface initiated Kumada catalyst-transfer polycondensation). This way, the thickness of the polymer layer of organic photovoltaic devices can be controlled. Ni(0) catalyst is used to make reactive initiator monolayers followed by ligand exchange and then growing polymer brushes from these reactive initiator monolayers. Organic photovoltaic devices have the advantages of covering large areas and flexible surfaces of solar panels over inorganic photovoltaic devices. The controlled thickness polymer coating provides more control on the energy harvest process.

Lung Cancer Cell Enrichment with Buffer Stream via Biocompatible Ferrofluid and Microfluidic Device
So Hyun Lim, CURO Research Assistant
Dr. Leidong Mao, College of Engineering

Metastasis due to circulating tumor cells (CTCs) is the major cause of cancer related deaths. The difficulty in metastasis prevention is due to rarity of CTCs in the bloodstream which is estimated to be one CTC per billions of blood cells. Existing methods to separate cancer cells from whole blood pose three problems: expensive cost, long duration for procedure and physical and chemical damage on CTCs which reduces cell viability, hindering further analysis with separated cells. In this study, lung cancer cell enrichment from buffer stream via microfluidic device with biocompatible ferrofluid, in laminar flow with whole blood sample, provides low cost, short duration lung cancer cell separation with minimized damage on the cell. Lung cancer cell is separated from whole blood based on

the difference in cell sizes. Biocompatible ferrofluid is used to allow transitioning of lung cancer cell from the whole blood to a buffer stream, which minimizes the contact time between lung cancer cell and ferrofluid, allowing least amount of physical and chemical damage done to the cell by biocompatible ferrofluid, as well as increased cell viability. Furthermore, buffer stream was collected to enrich lung cancer cells, allowing not only medical analysis such as diagnosis, prognostic monitoring and treatment plans, but also laboratory analysis including but not limited to therapeutic efficiency, physical and chemical studies of cells as well as genetic studies.

A Romance: A Creative Writing Project
Christian Lisa, CURO Graduation Distinction, CURO Research Assistant
Prof. LeAnne Howe, English, Franklin College of Arts & Sciences

A Romance is an episodic novella about student-athletes. The work follows the parallel storylines of Sarah Jenson, a cross country runner at The University of Vermont, and Darius Williams, a highly-recruited linebacker at Notre Dame. The work is a coming-of-age story that covers themes of social isolation, ambition, drug use, and depression—all through the lens of collegiate athletics. While working on the project, I was interested in an avant-garde, maximalist style. The work employs humor, colloquial language, pop-culture references, footnotes, and social media posts as found objects to convey a substantial amount of detail and achieve intimacy with the reader. The work is written from the shifting perspectives of several different characters—jumping between scenes and people, the story presents reality in a fractured non-diachronic way. Complicated but never confusing, *A Romance* follows characters that are united by their relentless ambition and escapist tendencies. It is an examination of physical achievement and the American dream, and the larger cultural implications of a society-wide obsession with sports.

The Effect of Gender Identification and Division of Labor on the Work and Family Experiences of Same Sex Couples
Lauren Locklear, CURO Research Assistant
Dr. Malissa Clark, Psychology, Franklin College of Arts & Sciences

Although work-family conflict has been thoroughly researched for heterosexual couples (e.g., Byron, 2005; Michel, Kotrba, Mitchelson, Clark, & Baltes, 2011), minimal research exists about the work and family experiences of same-sex couples. With the recent ban on same-sex marriage lifted, it is more critical than ever to understand the work and family experiences of same-sex couples. In heterosexual couples, traditional gender role expectations suggest that men tend to contribute more financially while women place greater focus on home and family responsibilities (Blair-Loy, 2001). The small amount of research on gender identification and division of labor for same-sex couples is inconclusive. Therefore, this study explores gender-identification and division of labor in both gay and lesbian couples, and how this affects levels of work-family conflict. Participants will be recruited through advertisements posted on Facebook. To be eligible for the study, couples must be currently in a long-term same-sex relationship, cohabitating with their partner, and employed full-time. During the first phase of the study, each partner completes a questionnaire that assesses their gender role identification (Bem, 1974), division of labor in the household (custom measure), partner support (Shakespeare-Finch & Obst, 2011), and job demands (van Veldhoven & Meijman, 1994). Two weeks following completion of phase one of the study, each partner completes a questionnaire that assesses work-family conflict (Carlson, Kacmar, & Williams, 2000). Multiple regression analysis will test the

relationship between division of labor and work-family conflict, as well as the moderating role of gender role identity, job demands, and partner support.

Third Party Reactions to Mistreatment: A Meta-Analysis

Lauren Locklear, CURO Research Assistant
Ian Armstrong
Dr. Marie Mitchell, Management, Terry College of Business

Mistreatment in the workplace is commonplace, and may involve supervisors, peers, and even organizational outsiders such as customers. This mistreatment manifests in many forms such as abusive supervision (Tepper, 2000), social undermining (Duffy, Ganster, & Pagon, 2002), incivility (Andersson & Pearson, 1999), bullying (Einarsen & Skogstad, 1996), exclusion or ostracism (Ferris, Brown, Berry, & Lian, 2008; Hitlan & Noel, 2009), deviance or counterproductive behavior (Robinson & Bennett, 1995), and sexual harassment (Lim & Cortina, 2005). Previous research focused on the employer-employee relationship, particularly the reaction of the employee (the victim) to mistreatment by his or her employer (Skarliki & Kulik, 2005). However, recent research has moved beyond the victims of mistreatment to examine the reactions of third parties who witness abuse events. A third party witness is as an individual who forms impressions of organizational justice based upon direct, indirect, or vicarious experience of an organization. At present, this research stream has reached a critical mass, making it necessary to analyze the empirical findings to reveal the direction third party abuse research should take moving forward. Using the meta-analytic techniques outlined by Schmidt & Hunter, (2014) we will examine the effects of mistreatment episodes on third parties. We propose that witnesses will have cognitions (i.e., thoughts of revenge) and emotions (i.e., feelings of anger) following the abuse event which will lead to changes in behavior, well-being, and job attitudes. This meta-analysis aims to determine which of the previously explored relationships in the existing empirical research have the strongest support. Findings will provide a model for researchers to use moving forward in third party research.

Investigating the Role of Cyanogenic Glycosides in *Passiflora incarnata* (Maypop)

Atul Lodh, CURO Research Assistant
Dr. Rodney Mauricio, Genetics, Franklin College of Arts & Sciences

Plants produce the largest variety of metabolites of any organism on the planet. However, the evolutionary forces that generate this diversity are still unresolved. A leading hypothesis is that these metabolites serve as defenses against insect herbivores that utilize plants for food. Defensive metabolites produced can alter a plant's fitness and the fitness of the herbivore that feeds on it, resulting in a co-evolutionary relationship between the two. One putatively defensive metabolite is cyanogenic glycoside. Hydrolysis of this compound leads to the production of hydrogen cyanide, a toxic compound that interferes with cellular respiration. A plant species that produces cyanogenic glycoside is *Passiflora incarnata*, a plant species native to Athens, Georgia. To test the hypothesis that cyanogenic glycoside is a defensive metabolite and therefore is under natural selection by insect herbivores, a common garden experiment was conducted over the summer of 2015 using the plant species *P. incarnata*. A split-plot design was used where clonal replicates of genotypes were exposed to herbivores or protected from them using a pesticide. If herbivores are selecting for cyanogenic glycoside production, then plants that produce the most cyanogenic glycosides should have the highest fitness (measured by looking at fruit production)

when exposed to herbivores. Furthermore, when plants are protected from herbivores, there should be relaxed selection on cyanogenic glycoside production. This work provides further insight into the importance of metabolites in mediating plant-herbivore co-evolutionary interactions.

Regulation of Intracellular Membrane Fusion by V-ATPase Subunits

Michael Lopez, CURO Research Assistant
Dr. Vincent Starai, Microbiology, Franklin College of Arts & Sciences

Eukaryotic organisms must properly package, sort, and deliver proteins and membranes to a number of essential intracellular organelles during normal cell growth, which usually demands the fusion of transport vesicles with their target membranes. For these membrane fusion events to occur, a conserved "core" protein machinery consisting of SNARE proteins, Rab-family small GTPases, and multisubunit tethering factors must be present on both membranes. While much of the fundamental mechanistic information regarding the activity of this core machinery during fusion is known, additional factors which precisely regulate the SNAREs/Rabs/tethering factors during fusion remain to be characterized. It is now thought that a number of accessory proteins and lipids help catalyze specific fusion events by directly regulating the activities of these "core" proteins. Previous research has potentially identified one such accessory protein, the membrane-bound multisubunit subdomain of the eukaryotic V-ATPase (Vo). In the budding yeast, *Saccharomyces cerevisiae*, vacuolar (lysosomal) membranes lacking the Vo subdomain fail to homotypically fuse *in vitro*, and it has therefore been proposed that Vo serves a structural role in regulating endolysosmal SNARE-dependent fusion events. To test the hypothesis that the Vo domain plays some role in vacuolar fusion, modified yeast strains lacking both subunit "a" isoforms (Vph1p and Stv1p) of the V-ATPase Vo domain will be modified to express TgVha1, the Vph1p/Stv1p ortholog originating from the apicomplexan parasite, *Toxoplasma gondii*. Yeast strains expressing TgVha1 in place of Vph1p/Stv1p displayed a fragmented vacuolar morphology similar to yeast strains unable to properly fuse their vacuoles *in vivo*. Furthermore, these strains were able to grow in the presence of zinc and caffeine, suggesting that the V-ATPase formed with TgVha1 was functional for vacuolar acidification. These results suggest that this biochemically active V-ATPase was unable to properly regulate yeast endolysosomal fusion events, thus providing evidence that subunit "a" may play a physical role in regulating membrane fusion. Further characterization of this activity will require the isolation of intact vacuoles from yeast strains expressing TgVha1 and measuring V-ATPase activity *in vitro*, and the direct measurement of homotypic fusion of TgVha1-containing vacuoles. These results will help elucidate the role of the V-ATPase "a" subunit in endolysosomal fusion events.

An Analysis of Trends in Difficulties Faced by Beginning Music Educators, with Discussion and Implementation of Effective Classroom Solutions

Duncan Lord
Dr. Joshua Bynum, Hugh Hodgson School of Music

This project will provide a meaningful look at the challenges of beginning a career in education, with the goal of addressing a common problem among early educators: a perceived lack of sufficient experience to handle situations faced early on. This research will conduct a cross-sectional survey of primary and secondary music educators, with the intent to locate trending difficulties observed by the sample group within the first five years of teaching. An analysis of these trends will be presented, looking at why

certain experiences and difficulties were specific to a specialization, while others were shared across the entire field. Discussion of effective solutions suggested by the subjects will be presented along with recommendations for application in the classroom. By providing application and implementation strategies, this project will be a resource for pre-service and beginning music educators.

Motherhood, War and Ownership in Bertolt Brecht's "Mother Courage and Her Children" and "The Caucasian Chalk Circle"

Kelsey Lowrey, Foundation Fellow
Dr. Martin Kagel, Germanic & Slavic Studies, Franklin College of Arts & Sciences

I studied the presentation and implications of motherhood in two famous epic theatre plays by the German author Bertolt Brecht: Mother Courage and Her Children / Mutter Courage und ihre Kinder and The Caucasian Chalk Circle / Der kaukasische Kreidekreis. The concept of motherhood was examined first through the lens of war and peace, the main characters of these plays are women displaced by various historical wars; the fruitfulness of their motherhood was found to be closely related to the justness of different violent conflicts. As the women all lived in exile, their motherhood was also examined through its relation to the home and homemaking, as well as the historical context of real-world mothers in exile and in the home, and Nazi propaganda of the era dealing with racial and land-based ideals of motherhood. An in-depth look was taken at the character Kattrin from Mother Courage and her status as a role accessible to female and otherwise oppressed audience members, as well as her complicated relation to performative gender, female sexuality, and sexual violence. Ultimately, the findings deal with motherhood and female disenfranchisement on one end, and motherhood as an allegory for the Marxist concept of "ownership" on the other, and its aptness as such.

Modeling and Analysis of Virus-Bacteria Interactions in the Marine Environment

Angela Lucero
Dr. Adrian Burd, Lamar Dodd School of Art

Viral infections in the ocean are a major source of mortality in marine bacteria, thereby influencing the composition of bacterial communities. The purpose of this study is to investigate the interactions between viruses and bacteria in the marine environment to determine the extent to which these interactions influence dissolved organic carbon (DOC) concentrations and the bacterial community composition. Consider a lysed bacterial cell. It will produce a small cloud rich in both dissolved nutrients and viruses. The high nutrient concentrations will likely attract motile bacteria, while the high viral concentrations will increase their chances of infection. This study will use mathematical descriptions of virus-bacteria interactions and bacterial chemotaxis that will be investigated analytically and numerically. The study is expected to produce a model indicating how bacterial communities and DOC concentrations change as functions of viral concentration and infection rates. This is important because changes in bacterial community composition, especially in the deep ocean, affect the amount of carbon that can be sequestered by the oceans, which in turn has implications for the amount of carbon dioxide in the atmosphere.

Fluorescent Protein Incorporation in *E. coli* for Determination of Gene Expression Levels

Andrew Lyon, CURO Research Assistant
Dr. Yajun Yan, College of Engineering

The following research project focuses on a metabolic engineering approach for the creation of a biosensor. The overall goal is to

clone a fluorescent gene in a microorganism to determine expression levels of a protein of interest. Green Fluorescent Protein is derived from the crystal jellyfish *Aequorea Victoria*. By cloning the fluorescent gene under the promoter of interest, gene expression can be monitored. In essence, the protein can be used as a transcription reporter. Following the construction of the plasmid containing the fluorescent gene, we introduced the plasmid in *E. coli*. It is known that acrylic acid has an effect on gene expression levels by interacting with the specific promoter. Shake flask fermentations were subsequently carried out to determine the sensitivity of the fluorescence activity with the addition of varying acrylic acid concentrations. Due to issues with the machine that measures fluorescence intensity, we are still waiting on results. We expect to see an increase in fluorescence activity with increases in acrylic acid. This approach is very useful when studying transcription of genes under various promoters. This is very important for the optimization of microbial processes for the production of chemicals, renewable fuels, biopharmaceuticals, etc.

Exploring Alternative Mechanisms of RidA-Independent 2AA Stress Relief

Samuel Macfie, CURO Research Assistant
Dr. Diana Downs, Microbiology, Franklin College of Arts & Sciences

Many proteins that belong to the widely conserved RidA/YER057c/UK114 protein family hydrolyze reactive enamine/imine intermediates generated by some pyridoxal 5'-pyrophosphate (PLP)-depedent enzymes. The RidA protein in *Salmonella enterica* catalyzes the hydrolysis of the reactive enamine, 2-aminoacrylate (2AA), produced by PLP-dependent serine/threonine dehydratases, preventing 2AA from diffusing through the cell and damaging cellular targets. In *S. enterica*, cystathionine β-lyase (MetC) participates in methionine biosynthesis by cleaving the β-carbon-sulfur bond of cystathionine to yield homocysteine. Suppressor analysis showed overexpression of the *metC* gene in trans could overcome the growth defects of a *ridA* mutant strain. The molecular mechanism that mediates this suppression is currently unknown. Preliminary experiments indicated MetC does not possess RidA activity, suggesting an indirect mechanism of overcoming 2AA stress. β-cystathionase (MalY) and tryptophanase (TnaA) from *Escherichia coli* are PLP-dependent enzymes that perform β-elimination reactions similar to MetC and share a conserved protein fold-type. Our investigation seeks to determine if these enzymatic similarities to MetC allow MalY and/or TnaA to alleviate 2AA stress in the absence of RidA. Work presented here describes the molecular cloning and heterologous expression of *malY* and *tnaA* from *E. coli* in *S. enterica* lacking RidA. Insights from this work will aid us in elucidating the mechanism of MetC suppression of *ridA* strain growth defects.

Eradicating Food Insecurity in Metro Atlanta

Mallika Madhusudan, Foundation Fellow
Dr. Jerry Shannon, Geography, Franklin College of Arts & Sciences

The USDA defines households as food insecure if they are located more than one mile away from a source of fresh produce or are generally unable to purchase fresh food. Because of the high price of fresh produce and the lack of transportation, many Atlanta citizens are considered food insecure. This means they are forced to turn to fast food restaurants or convenience stores for their dietary needs, both of which rarely sell healthy alternatives. A continuous diet lacking in fresh produce contributes to high rates of obesity, heart disease, and hypertension. These diseases not only have serious health implications, but also account for major economic losses. This leaves us with the

question: What action must be taken to address the issue of food insecurity? This paper begins with a background of the issue of food insecurity in the context of Atlanta, describes the issue's various causes, symptoms, and implications and then develops four policy alternatives, including the status quo. The other policy alternatives are a Healthy Corner Store Initiative, Food-to-Institution programs, and public-private partnership loan funds. The paper will then utilize a policy matrix to compare and contrast these various policy alternatives based on health outcomes, change in fresh produce consumption, political feasibility, and a basic cost-benefit analysis. Through this method of policy analysis, this paper concludes that the Healthy Corner Store Initiative best addresses food insecurity within Atlanta. Following this recommendation, the paper will review implementation of the chosen policy and identify potential challenges.

Correspondence between Family Needs and Family Goals: Implications for Early Childhood Interventions for Low-Income Families

Emily Maloney, Foundation Fellow
Dr. Stacey Neuharth-Pritchett, Educational Psychology, College of Education

Children living in poverty often encounter adverse childhood experiences (ACEs), placing them at-risk for prolonged negative cognitive, emotional, physical, and mental health issues. Research from neuroscience suggests children living in toxic stress conditions demonstrate decreased executive functioning skills--the higher cognitive functions responsible for memory, inhibitory control, and mental flexibility. The Head Start program serves as a stabilizing preschool environment for children with ACEs to attenuate the effects of living in poverty. When applying for Head Start, families supply background information on ACEs and family needs. Head Start, then theoretically, uses the family needs assessment to help the family set attainable goals realized by program exit. What is missing from this process is often congruence between stated goals and identified risk factors. Further, interventions that support the needs of families are often misaligned with the true needs of families resulting in less than efficacious outcomes. The research question for this casual-comparative study was: What is the relationship between number of ACEs, family needs and goals, and child developmental outcomes for families with children in home-based and center-based early care and education programs? Results indicated the number of ACEs experienced by families was related to needs expressed by parents including employment, finances, mental health resources, parent/child bonding, and education. About a quarter of children with more ACEs had parents who specified goals inconsistent with needs. Children in families experiencing more ACEs had poorer cognitive development scores. Implications for the highest-need families where goals were misaligned with interventions will be discussed.

Reducing Teacher Turnover in Georgia Public Schools

Emily Maloney, Foundation Fellow
Dr. Linda Renzulli, Sociology, Franklin College of Arts & Sciences

This policy research investigated the teacher turnover rate in public schools in Georgia, particularly in schools with high percentages of low socioeconomic status and minority students. This research considered the symptoms and causes of turnover in these environments, and why previous policies enacted by the Georgia Department of Education have failed. Through the literature review and interview process, some common themes were identified as to why teachers consistently leave schools. These qualities of school environment typically included

practices that de-professionalized teachers, culminating in teachers losing a sense of autonomy within the school, discovering a lack of support from other teachers and administration, and being unsatisfied with their salary in relation to how many hours they put into their jobs both in and out of schools. To address these causes, three policy alternatives were developed: a research and development program, an intensive district-wide mentorship program based off of a highly successful model in Maryland, and treating departments within schools as designers by removing some of the bureaucratic accountability measures which cut into teachers' time both at and away from school. After using a policy matrix to analyze the effectiveness, cost-benefit, and feasibility of each alternative against the status quo, this policy paper asserts that the best option is the research and development model.

A Policy Proposal for the Reduction of Violence in Georgia's State Prisons

Taylor Martin
Rachael Andrews
Dr. Andrew Whitford, Public Administration & Policy, School of Public & International Affairs

Georgia has the 6th highest incarceration rate in the United States and operates the 5th largest prison system in the nation, costing approximately one billion dollars annually. As a result of the high incarceration rates, overcrowding has led to violence and astronomical costs on behalf of the Georgia taxpayers due to housing inmates. In 2014, the Southern Center for Human Rights released a report detailing Georgia's violent prison crisis. Georgia has seen a rise in the number of homicides and assaults throughout the prison system. In 2012, the number of homicides in Georgia surpassed those of many states in the past ten years, from 2001–2011. Despite the State of Georgia's attempted criminal justice reform, prison populations remain high, continuing the cycle of violence and high prison costs. This paper proposes policy options to the Georgia Board of Corrections in an attempt to reduce current prison populations or implement new strategies and policies to decrease the likelihood of violence in the future. The policy options evaluated include: the reworking of current legislation pertaining to drug possession, including but not limited to the de-criminalization of marijuana and the increase in the minimum amount of drugs considered to be possession with intent to distribute; the rehabilitation and improvement of vocational training programs; and the increased provision of resources available to prison officials to facilitate effectiveness and supervision. Ideally these policy approaches would be included in a comprehensive three-pronged approach; however, it is recommended that the State of Georgia adopt policy number two.

Cooling Fabric: The Future of Keeping Cool

Molly Mastin, CURO Research Assistant
Dr. Suraj Sharma, Textiles, Merchandising & Interiors, College of Family & Consumer Sciences

Smart textiles are the future of the textile industry. As technology becomes more readily available, it is integrating into many facets including the textile industry. It allows for more sustainable practices and allows people to be safer, and more comfortable. One such textile is a fabric called Brrr!. This fabric is a cooling, and wicking fabric that uses powered air to keep the wearer cool. Being powered by air means that the air flow through the fabric is used to regenerate your cool, verses a finishing that would wash off over time. It also provides UV protection. There are many instances in which cooling fabric could greatly improve the wearers' experience, and save firms a lot of money. One such case is in the use of health care workers in very hot areas

such as in the case of EBOLA workers in West Africa. Another use could be in military personnel in desert settings. I tested Brrr! Fabric in order to find out more about the fabric's structural characteristics, in order to determine alternative uses outside of the fashion industry. I used several different test methods including determining yarn strength, and wicking capability of the fabric. The result is that this fabric could be suitable for more than just fashion uses. Cooling fabrics could be used in uniforms and other ways in order to help keep wearers safe from overheating, and keeping them cooler in general. This also lead me to ask the question of the appropriateness of using this and other smart fabrics in alternative ways in order to keep users safe, and comfortable.

Male Participation in Chronic Disease Self-Management Education (CDSME) Programs

Jamarcus Mathis, CURO Honors Scholar
Dr. Matthew Smith, Health Promotion & Behavior, College of Public Health

Females outnumber males in the older adult population and are more likely to participate in evidence-based health promotion programs. Despite the widespread availability of Stanford's Chronic Disease Self-Management Education (CDSME) programs, and their known health-related benefits, male participation remains low. This study: (1) compares personal characteristics between males and females who attended CDSME program workshops; and (2) identifies factors associated with successful intervention completion (attending 4+ of the 6 workshop sessions) among male participants. Data were initially analyzed from 62,757 adults collected during a national dissemination of CDSME programs spanning 47 states and two territories. Logistic regression was performed with males only (n=13,088) to examine factors associated with workshop attendance. Of the 62,757 adults who enrolled in CDSME programs, only 20.9% were male. Compared to female participants, male participants were younger ($x^2=316.86$, $P<0.001$) and reported fewer chronic conditions ($x^2=414.94$, $P<0.001$). Among male participants alone, those age 65+ (OR=133, $P<0.001$) and those residing in non-metro areas (OR=1.14, $P=0.019$) were more likely to successfully complete the intervention. Compared to attending workshops in senior centers, males who attended workshops in healthcare organizations (OR=0.79, $P=0.001$) and residential facilities (OR=0.73, $P<0.001$) were less likely to successfully complete the intervention. Men who participated in workshops with a larger proportion of male participants were more likely to successfully complete the intervention (OR=2.21, $P<0.001$). Once engaged in CDSME programs, male participants obtain a similar intervention dose as their female counterparts. Findings highlight opportunities to tailor CDSME program recruitment and retention strategies for men.

An Investigation into the Complex Viral Interactions between *Microplitis demolitor* Bracovirus and TnAV-2a, an Ascovirus

Johnathan Mayfield, CURO Research Assistant
Dr. Gaelen Burke, Entomology, College of Agricultural & Environmental Sciences

Parasitoid wasps are a diverse and abundant group of organisms that spend part of their development either within or on their host. One group of parasitoid wasps, the superfamily Ichneumonoidea, has evolved an obligate, beneficial symbiosis with the double-stranded DNA Polydnaviruses. *Microplitis demolitor* bracovirus, or MdBV, is a polydnavirus found within the ovaries of the wasp host *M. demolitor* and has been shown to alter the immune system of the host to promote parasitism. Our project aimed to determine if MdBV interacts with other

viruses within the host, specifically the ascovirus TnAV-2a. TnAV-2a is a pathogenic, double-stranded DNA virus that infects early stages of Lepidopteran hosts and is only transmitted on the ovipositor of parasitoid wasps like *M. demolitor*. Based on quantitative PCR analysis, we have determined a species specific interaction between these two viruses. In parasitized hosts, TnAV-2a replication was lower at 24, 48, and 168 hours post infection within *Pseudoplusia includens*. In the hosts *Trichoplusia ni*, *Spodoptera frugiperda*, *Helicoverpa zea*, and *Heliothis virescens* we did not see any significant difference between parasitized hosts and unparasitized hosts in terms of TnAV-2a replication at 48 hours post infection. Within *P. includens*, we infected the host with both MdBV and TnAV-2a and determined that MdBV is the cause for lower TnAV-2a replication. Lastly, we unsuccessfully attempted to generalize the effect we saw in *P. includens* to a cell line derived from the same host suggesting that this interaction is more complex and involves many factors within the host.

Earning Disparity among White and Black Women in South Africa

Thomas McBrearty
Dr. Laura Zimmermann, Economics, Terry College of Business

This research will center around the decreasing race-based income inequality in post-Apartheid South Africa over the last 22 years. Before apartheid was abolished there was overt and legal discrimination against black individuals in the country that directly limited their educational and employment opportunities, and there exists thorough Census Data from both before apartheid's abolition and ten years after. This will enable using a difference-in-difference analysis using identical families and their earning potential and familial income over time, using the end of apartheid and extension of the lucrative South African-pension program to every working citizen (i.e., extension to non-white citizens) as the center point of the analysis. It is my contention that the extension of the pension program to the entire working populace drastically increased the educational opportunities for younger black South Africans, both male and female, and therefore drastically increased their lifelong earning potential. I will be using existing research on this topic and raw household Census data to measure if and by what degree the income inequality and earning potential gap has decreased.

An Exploration of Communicative Intent and Its Relation to Early Vocalization Production in Two Young Children with Autism Spectrum Disorder

MacKenzie McGraw, Breanna Johnson, Sherry Sayavongsa, Alexis Pope, Meredith Towey, Hayley O'Hara, Sabrina Williams, Courtney Todd, Brianna Kelley, Anna Fink, Chase Kranzlein
Dr. Sandie Bass-Ringdahl, Communication Sciences & Special Education, College of Education

Autism Spectrum Disorder (ASD) refers to the wide range of symptoms, skills, and levels of impairment or disability that children with ASD can have. The most common sign that prompts parental concern is the delay in onset of spoken words, including delayed or disrupted onset of babbling (beyond the typical 6–10 months of age) and gesture usage (Barenek; Mitchell et al.). Early identification and intervention are widely recognized as critical to language development and are significant variables in the development of communication (Yoshinaga-Itano, 1998). Children with ASD who have undergone early intervention demonstrate gains in verbal and nonverbal communication, intelligence test scores, and peer interaction (Wiggins et al.). The purpose of the current study is to determine if vocalization production is altered in the presence of a caregiver or an electronic

device. The current study is a retrospective analysis of data from two participants with ASD and their caregivers. The first child observed was a 3 year, 9 month old male diagnosed with ASD and developmental screen of 4 months. The second child observed was a 1 year, 7 month old male diagnosed with ASD and developmental screen of 8 months. A 12–16 hour vocalization recording was collected in the home using the LENA device. This recording was then segmented into 5 minute blocks using an automated algorithm for basic components. The results of this analysis may provide insight into intervention techniques that may increase vocal productions serving a communicative function. The results may also have implications for environmental modifications in the home.

Understanding the Public's Relationships with ISIS and Counter-Terrorism Digital Media

Katherine McKeogh
Dr. Juan Meng, Grady College of Journalism & Mass Communication

Purpose: The purpose of this research is to examine and analyze the digital communication strategies used by ISIS, as well as the strategies used by the US State Department against ISIS. The research aims to learn who is viewing ISIS's messages, as well as learn more about who is targeted by and most receptive to their messaging. It also aims to learn whether or not the anti-terrorism social media strategies of the US State Department are effective. *Design/methodology/approach*: The researcher used two research methods in this study to investigate the subject: (1) an online survey of UGA undergraduate students; (2) two focus groups—one with four participants and the other with two participants—with UGA students. *Findings*: Results suggest that students at the University of Georgia are generally unaware of ISIS's social media presence. Despite ISIS's 9,000 social media accounts, almost no students had seen an ISIS tweet. Of the students that had seen ISIS messaging, the majority had been exposed to videos and remembered those most clearly. Students felt negatively about the US State Department's counter-terrorism efforts when compared to ISIS's efforts on social media. *Practical implications*: Contrary to general opinion, most young adults are not exposed to or are aware of ISIS's social media presence. However, the US State Department needs to re-construct its counter-terrorism efforts via social media, especially in video creation as young adults are most frequently exposed in that way. The lack of sophistication in current US State Department videos as compared to ISIS videos, led students to feel more threatened by ISIS. *Originality/value*: This study provides insights into ways to improve the effectiveness of online counter-terrorism efforts. It is important to improve social media tactics now, as terrorist group's influence in the digital sphere will continue to evolve.

Implementation of picoSpin(TM) NMRs into Organic Chemistry Teaching Laboratories through Spectral Analysis of Fischer Esterification Products

Emma Meehan, Doyle Wallace
Dr. Richard Morrison, Chemistry, Franklin College of Arts & Sciences

1H NMR analysis is an important analytical technique discussed in the introductory organic chemistry lecture course as it is most useful in real-world applications for the identification of a product or product mixture. The Chemistry Department recently acquired three desktop 1H NMRs for the undergraduate organic laboratories. Until now, NMR analysis has been largely impossible for the vast majority of students in teaching laboratories. Using these new technologies, the picoSpin(TM) NMRs were integrated into the undergraduate instructional

laboratory to expose students to advanced analytical techniques in the exploration of experimental results. Students specifically used unknown starting alcohols to synthesize esters through Fischer esterification, identifying the unknown starting component via spectral analysis of the product. Over the course of three semesters, 483 students out of 636 (76%) students correctly identified the starting alcohol and 76% of students indicated via survey that 1H NMR was the most helpful identification tool in their analysis. This experience strengthened the concept of NMR spectral analysis and provided students with the opportunity to employ technology commonly used in academic research facilities.

Longitudinal Assessment of a Porcine Traumatic Brain Injury Model Utilizing Immunohistochemistry

Mary Mehegan, CURO Summer Fellow, CURO Research Assistant
Dr. Franklin West, Animal & Dairy Science, College of Agricultural & Environmental Sciences

In the United States alone, approximately 50,000 deaths result from traumatic brain injury (TBI) annually. At this time, there is no adequate TBI treatment. Neural stem cells may serve as a regenerative cell replacement therapy, as they are capable of differentiating into neurons, astrocytes, and oligodendrocytes and produce regenerative factors such as vascular endothelial growth factor. These cells have been shown to lead to structural and functional improvement in rodent models that have suffered similar neural injuries. However, treatments that have been developed in rodent models regularly fail in clinical trials, thus more predictive large animal models are needed. With a large gyrencephalic brain and gray-white matter composition similar to humans, the pig is an effective large animal model. The objective of this study is to longitudinally assess changes in brain cellular composition in a piglet model of TBI. Piglets underwent surgery to generate a concussive TBI. To assess the time course of TBI pathology, piglets were sacrificed and brain tissues were collected 1 day, 1 week, and 4 weeks post-TBI. At the site of neuronal injury we assessed TBI pathology using Olig2, NeuN, and GFAP markers. Although no significant changes in Olig2 were noted; we found that neuronal cell death results in a reduction in NeuN staining 1 week post TBI, and that the upregulation of astrogliosis results in increased GFAP concentrations at both 1 week and 4 weeks post TBI. Once typical TBI pathology is fully established, we can determine if cell therapy aids in recovery of the brain at the cellular level.

Determining the Effect of Gut Microbes on *Drosophila suzukii* Gene Expression

Elijah Mehlferber, CURO Research Assistant
Dr. Patricia Moore, Entomology, College of Agricultural & Environmental Sciences

Drosophila suzukii inhabit a unique ecological niche, rather than ovipositing on rotting fruits they target ripening fruits. The larvae of most drosophilid species obtain the protein in their diets by consuming yeast that grows on rotting fruit, a resource not readily available to *D. suzukii* larvae. This raises interesting questions as to how *D. suzukii* larvae have adapted to thrive in a low protein environment. Previous research has shown that *Drosophila melanogastor* are unable to develop without gut microbes in a low protein environment, due to the inability to modulate their insulin signaling pathways. However, *D. suzukii* are able to develop under the same conditions, leading to the assumption that some function of the gut microbes has been adapted into the organism. In order to test this hypothesis *D. suzukii* larvae will be reared on low/high protein diets and in the presence/absence of gut microbes, and the expression of genes related to the insulin signaling and nutrient management pathways

will be measured. We expect that the *D. suzukii* raised on the low protein diet without gut microbes will show altered expression of these genes due to their hypothesized ability to self-regulate these pathways. This will allow insight into the interaction of gut microbes and *D. suzukii* as a result of their adaptation to lower protein environments.

Proteome and Glycome Profiling of Medaka Exposed to Chronic, Low Level Ionization Radiation

Olivia Mendel
Dr. Carl Bergmann, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Within the United States there are over 1000 locations that are contaminated with radiation. These places range from small laboratories to massive nuclear weapon facilities. Although this ionizing radiation (IR) is clearly recognized as problematic, there is minimal understanding of the mechanisms through which radiation influences organismal adaptation. Furthermore, most experimental studies focus on the effects of acute, high dose IR. Thus, little is known about the effects of chronic, low doses of IR on vertebrate. Using Medaka fish as the model aquatic organism, this study aims to 1) quantify comparative proteomic and glycomic responses of Medaka across varying levels of chronic, low doses of IR and 2) identify proteins and glycans involved in organismal adaptation. These goals will be accomplished through coupling mass spectrometry with current bioinformatics tools to analyze samples of Medaka exposed to chronic, low doses of IR. Progress in this study has been made and thus far over 875 proteins have been quantified and glycome analysis has revealed major differences in the glycan composition of the control carcasses as compared to the treated samples. In the long term, these findings will elucidate the physiological responses of organisms to chronic, low dose IR and may be used to generate testable hypotheses regarding the evolutionary pathways associated with IR.

A First Description of Nest Behavior in Red-and-Green Macaws

Courtney Meyer
Dr. Dorothy Fragaszy, Psychology, Franklin College of Arts & Sciences

The nest behavior of the Red-and-Green Macaw (*Ara chloropterus*; the largest species in the *Ara* genus) in the wild is largely unknown and undescribed in the literature. We provide the first description of wild macaw nest behavior in which behaviors are directly observed and quantified. To understand the nest behavior of *A. chloropterus*, we have the following three objectives: to document the behavioral repertoire of nestlings; to examine behavior of the parents in the nest; and to determine nestling behavior in the presence vs absence of an adult. Video footage, recorded from approximately 6AM to 6PM within one nest over 6 days between August and October 2013, recorded the behavior of 4 individuals, including 2 adults and 2 nestlings. Videos are currently being coded using the Observer XT software. We report findings from the first two days, when the chicks were approximately 25 and 40 days old. Stationary behavior (e.g., perching) constituted the majority of the nestlings' time budget (91%). Adults were present with the nestlings 41% of the time, and when there, spent 24% of their time feeding the chicks, 36% stationary, and the remainder of their time in other activity. Nestlings vocalized six times more frequently than adults and only when adults were present. We plan to perform additional analyses of adult and nestling behavior as coding continues. Preliminary results show that Red-and-Green Macaws provide bi-parental care to young chicks, and in particular spend much time feeding them while in the nest.

Computational Modeling of Laboratory X-Ray Emission Due to Low-Energy Collisions of H-like and He-like Ions with H2

Ansley Miller
Dr. Phillip Stancil, Physics & Astronomy, Franklin College of Arts & Sciences

Charge exchange between highly-charged ions and neutral molecules, which occurs when the solar wind, or other astrophysical plasmas, collide with cool gas, emits observable X-rays with specific line intensities. Recent experiments of this process at Lawrence Livermore National Laboratory measured the X-ray hardness ratios of low-energy collisions between hydrogen- and helium-like ions with H2. Using our recently developed X-ray modeling package, Kronos_v2, which utilizes multi-channel Landau-Zener charge exchange cross sections, we have computed theoretical hydrogen-like hardness ratios to aid in interpretation of the experimental data. While the computed hardness ratios are somewhat smaller than the experiment, it provides an improved representation over earlier classical trajectory predictions. We are also in the process of building Kronos_v3; further enhancing the comprehensive charge exchange database to include helium-like and multielectron ions to allow for comparison with experiments and for models of hot astrophysical environments such as supernova remnants, star-forming galaxies, and galaxy clusters.

Results of Gender and Personality Interactions on Mobility in a Sample of Older Adults

Katherine Miller
Dr. Lloyd Stephen Miller, Psychology, Franklin College of Arts & Sciences

Due to a growing elderly population, measures and factors that predict mobility outcomes for older adults could prove useful. The focus of this project is whether personality, as moderated by gender, has an effect on mobility outcomes in late adult life. Based off of the literature of the general adult population, and research of older adult samples, we expected a significant effect. The sample (N = 100) was gathered from baseline measures of several aging studies from the Neuropsychology and Memory Assessment Laboratory at the University of Georgia. The sample composed of 59 women and 41 men, ranging in age from 64.5 to 99 years of age (= 74.46, s = 6.92), with a majority (90%) self-identifying as Caucasian. Using the Five Factor Inventory as a measure of personality, the Short Physical Performance Battery as a measure of mobility, and self-reported gender, the authors performed five separate multiple regressions of the interaction between each factor of personality and gender on mobility. We failed to find any main effects between personality and mobility, and gender and mobility, and we failed to find any significant interaction between personality and gender on mobility (all p-values > 0.05). This result is surprising, since the literature typically shows effects of different personality factors on various aspects of physical health, but it might be due to a relatively healthy sample with overly similar personality profiles. The authors recommend that future studies use more diverse samples for their analyses.

Friends and Coworkers

Molly Minnen
Dr. Michelle vanDellen, Psychology, Franklin College of Arts & Sciences

Although gratitude has been connected to positive outcomes in close relationships, research has not yet examined how people experience and express gratitude in the workplace. In gratitude exchanges, a benefactor makes a sacrifice to provide a favor to a recipient. We expect the characteristics of the benefactor may influence the extent to which recipients perceive a sacrifice as difficult. Recipients may feel as

though it was more of a sacrifice for the low self-control benefactor to do the favor than it was for the high self-control benefactor. Consequently, recipients may experience and express less gratitude toward a high self-control benefactor. The goal of this study will be to assess how a recipient might feel different levels of gratitude towards a benefactor if that benefactor is perceived as having high or low levels of self-control. Participants will read personality profiles for a recipient and a benefactor followed by a scenario where the benefactor does a favor for the recipient. Participants will be randomly assigned to see a benefactor profile reflecting high (vs. low) self-control; the recipient profile will remain constant in all conditions. Participants will evaluate how they think the recipient will respond to the favor. We hypothesize that participants will predict the recipient will feel less gratitude towards benefactor in the high self-control condition than in the low self-control condition. Results from this study could provide novel insights into why people express gratitude differently towards others and how companies could foster positive workplace experiences for valuable employees with high self-control.

Investigating miRNA-195-Mediated Regulation of Cell Cycle Gene CHEK1 in Respiratory Syncytial Virus (RSV) Replication

Madison Miracle
Dr. Ralph Tripp, Infectious Diseases, College of Veterinary Medicine

Respiratory syncytial virus (RSV) is the most common cause of bronchiolitis in young children and the elderly, often resulting in complications such as asthma. A class of 21-23nt small RNAs called microRNAs (miRNAs) can regulate post-transcriptional expression of host genes and modify viral replication. Of the validated miRNAs known to influence RSV replication, we have focused on miR-195, which is predicted to regulate CHEK1—a host gene involved in cell cycle regulation and RSV replication. CHEK1 expression and its subsequent impact on viral replication will be monitored using qPCR and viral plaque assays following transfection of miR-195 inhibitors and mimics, such as silenced using short interfering RNAs (siRNAs). Additionally, we will assay for cell cycle regulation and DNA damage upon CHEK-1 and miR-195 modulation. These findings will increase our understanding of molecular mechanisms at the viral-host interface that contribute to virulence and aid future development of targeted RSV therapeutics using RNAi technology.

Differences in Brain Morphometry as a Predictor of Smoking Cessation Treatment Success in Nicotine-Dependent Smokers

Abigail Mistretta
Dr. Lawrence Sweet, Psychology, Franklin College of Arts & Sciences

Tobacco use is the leading preventable cause of death in the U.S, with most cessation attempts ending in failure. Although smokers have been shown to have reduced grey matter in certain brain regions compared to non-smokers, there is a lack of knowledge about how differences in neural structure affect smokers' ability to stop smoking cigarettes. In this study we aim to identify structural differences between the brains of participants who successfully quit smoking and those who failed to quit smoking. As part of a larger neuroimaging study, anatomical images were acquired for 51 healthy, nicotine-dependent participants**.** Following the MRI scan, participants completed an eight-week smoking cessation treatment program. Using the program FreeSurfer, we will analyze structural MRI data from these subjects to determine volumes of six a priori regions of interest (ROI) that have been previously implicated in nicotine dependence, habit learning, and drug reinforcement. These regions include the

thalamus, putamen, hippocampus, cuneus, dorsolateral prefrontal cortex, and anterior cingulate cortex. We will then test volume, thickness, and surface area of regions located in the cortex as predictors of treatment success using multiple regression analysis. Based on prior literature, we expect to find significant differences in the morphometric properties of the a priori ROI's between successful and non-successful quitters.

Assessing Trapezius Endurance Using Electrical Twitch Stimulation after Exercise

Kajal Mistry, CURO Research Assistant
Dr. Kevin McCully, Kinesiology, College of Education

Muscle fatigue from daily activities can cause problems in both healthy and diseased/injured populations. The purpose of the present study was to quantify fatigue in the trapezius muscle after carrying a weighted backpack. This project is important because we can compare a rested muscle to an exercised muscle and clinically use that information to make a positive impact on the affected population. Specifically, we are hoping to be able to translate the results to help people with mitochondrial diseases. We hypothesize that walking one mile with a backpack will alter the fatigue test results. Participants consisted of healthy, college aged students Muscle fatigue was measured using a tri-axial accelerometer to measure muscle contraction during five minutes of electrical twitch stimulation (6Hz) at a comfortable current level. The accelerometer was placed on the surface of the skin over the trapezius muscle, and fatigue was measured before and after carrying a loaded backpack one mile at a brisk pace. We initially identified a supermaximal current level for seven participants. Each of the seven participants were able to reach there maximal current (mean=59mA sd=7.35). Furthermore, each of the participants were able to go above there threshold (mean= 54% SD= 0.209). This allowed us to measure both the amount of fatigue and the response of a fatigued muscle to a fatigue test. Our study will demonstrate how muscle fatigue can be quantified as a result of daily activities. The results confirmed that the backpack does fatigue the muscle more than a rested muscle. To have a successful comparison, we first completely fatigued the muscle doing shoulder shrugs; therefore, we had the best possible comparison.

The Spatial Interaction between Cordgrass and Oysters across an Estuarine Gradient

Lucas Montouchet, CURO Summer Fellow
Dr. Jeb Byers, Odum School of Ecology

Spatial interaction patterns between the reef forming oyster *Crassostrea virginica* and marsh cordgrass *Spartina alterniflora* are not well understood. These species are the predominant ecosystem engineers in Georgia saltmarshes and provide extensive ecosystem services. However little is known about of what mechanisms drive their patch distribution and morphology, and how these patterns may vary over environmental gradients. This project describes these spatial relationships and how they change over an estuarine gradient. Through analysis, of high resolution unmanned aerial vehicle imagery, species patch morphology, distribution and relationship to one-another were obtained. Flow, salinity and wave energy predictor variables were assessed through multiple linear regression. The project analyzes the relationship in 4 different ways. Analysis (1a) characterizes the reef shape and how perimeter affects the area of oyster reefs. (1b) characterizes the reef length in relation to area. (2a) examines the distance between reefs and the closest *Spartina* patch. (2b) explores the area of *Spartina* patches in relation to oyster reefs. While this project enhances our knowledge of the spatial interplay between

two important ecosystem engineers, it also provides valuable data for resource managers. This project will directly inform sight specific Living Shoreline design and oyster restoration projects by describing oyster and *Spartina* distribution patterns.

Georgia SOL (Solar Optimization by Location)
Elena Morais
Dr. David Stooksbury, College of Engineering

We are using a minimum of 15 years of daily solar radiation date from Blairsville, Tifton, and Griffin, Georgia to improve the current recommendation for the installation of fixed solar photovoltaic panels. We are finding the optimal angle for fixed solar panels based on what most beneficial and when electricity demand is highest. The current recommendations are to maximize the total solar electrical production over a year. However, the recommendation assumes a cloud free sky. In the Southeast, it is common for summer mornings to begin clear and for clouds to form in the early afternoon. Thus a due south orientation, the recommendation, may not be the optimum for Georgia. There are many cases where optimization for certain seasons rather than for the entire year is better. Schools are in session during the fall, winter, and spring. It would make more economic and environmental sense to optimize for the part of the year that has a higher electricity demand. This research will give recommendations specifically for Georgia.

Trace Level Determination of Trichloroethylene in Plasma by Headspace Solid-Phase Microextraction Gas Chromatography/Negative Chemical Ionization Mass Spectrometry
Kyle Mott, CURO Research Assistant
Dr. Michael Bartlett, Pharmaceutical & Biomedical Sciences, College of Pharmacy

Sensitive determination of trichloroethylene (TCE) is necessary for low-level doses given to rats during toxicokinetic experiments. An improved gas chromatography/negative chemical ionization mass spectrometry (GC-NCI-MS) method utilizing headspace solid-phase microextraction (SPME) was used for the determination of TCE in plasma. The method was optimized with respect to conditioning time of the SPME fiber, extraction time, desorption time, and inlet injection. The method displayed better sensitivity than previous bioanalytical methods, giving linearity over the range of 10 pg/mL – 10ng/mL, with a correlation coefficient (R2) of better than 0.99. The precision and accuracy of the method was determined to be better than 20% at the lower limit of quantitation and better than 15% over the remaining linear range, according to FDA guidelines. Validation determined that selected ion monitoring (SIM) of the 35Cl and 37Cl isotopes using NCI showed great sensitivity, down to ppt levels, due to the nature of NCI's affinity for halogens and the presence of three chlorine ions on the measured chemical of interest, TCE.

Characterization of murI, racD and racR of *Acinetobacter baylyi*
William Moxley
Dr. Ellen Neidle, Microbiology, Franklin College of Arts & Sciences

This project focuses on genes predicted to encode amino acid racemases. Such racemases are important for bacterial cell wall synthesis and biofilm formation. In higher organisms, D-amino acids are sometimes involved in cell signaling. Studies of amino acid racemization have broad significance and could lead to the development of beneficial drugs. As a first step toward such goals, we investigated *murI* (encoding D-glutamate racemase), *racD* (encoding D-aspartate racemase), and *rac*R (encoding a racD transcriptional regulator). Previous studies in *Vibrio fischeri* showed that

the lethal effect of deleting *murI* was counteracted by high-level *racD* expression, which appeared to be mediated by a RacR variant (M. Jones and E. Stabb, personal communication). These results suggest substrate ambiguity allowing RacD to produce D-glutamate. My goals were to improve understanding of *murI*, *racD*, and *rac*R by exploiting the ease of genetic manipulation in a bacterium, *Acinetobacter baylyi*. Mutants were created and characterized that contain deletions of the three genes of interest. As expected, the *murI* mutant required D-glutamate to grow. Site-directed and random mutagenesis methods were used to isolate strains that grow prototrophically despite the absence of *murI*. We predicted that these strains would have increased *racD* expression. Additionally, we tested the ability of *V. fischeri* genes to substitute for deletion of their *A. baylyi* homologs. Although these studies are not yet complete, our initial results indicate that this approach can improve our understanding of the function and regulation of *racD, rac*R, and *murI*. Alicia Schmidt, another lab member, contributed to this project.

Expression Analysis of Immune Genes in the Liver and Ceca of Blackhead Infected Turkeys

Adrea Mueller, CURO Honors Scholar
Dr. Robert Beckstead, Poultry Science, College of Agricultural & Environmental Sciences

Histomoniasis, commonly referred to as Blackhead disease, is a threat currently faced by the poultry industry. Blackhead is caused by infection of the parasitic protozoa *Histomonas meleagridis* in the ceca (and eventually liver). In turkeys this disease is highly fatal; symptoms include drooping head, pale neck, and yellow bile around the cloaca. There are no approved drugs on the market today that combat the disease and immunization attempts have only been partially successful. We hypothesize that feed additives such as fermentation products may be effective in prevention of colonization of *Histomonas meleagridis* and may also improve bird performance under a challenged situation. To test this, a yeast product was fed to turkeys and the immune response of control infected birds compared to birds fed a control diet. The weight of poults was taken prior to cloacal infection at day 18. Samples of liver and cecal tissue were collected from euthanized birds 5 and 10 days post infection. Initial data suggests that there is no statistical difference in treatment regarding infection percentage or in the liver and ceca lesion scores of infected birds on the control and treatment diets. Poult weight gain also remained statistically similar between control and yeast product diets. RNA from samples has been isolated and gene expression of CXCLi2, IFN-y, IL-10, IL-1B, IL-4, and IL-13 genes will be analyzed using rtPCR to examine immune response. Future research will be conducted to determine the yeast product's capability as a Histomoniasis prevention method and its effects on the immune response of turkeys.

Charge Exchange: Atomic Data of Astronomical Significance

Patrick Mullen
Dr. Phillip Stancil, Physics & Astronomy, Franklin College of Arts & Sciences

Charge exchange has emerged in X-ray emission modeling as a dominant process that must be considered in many astrophysical environments—such as comets, supernova remnants, the heliosphere, astrospheres of stars, galaxy clusters, and generally, highly ionized regions of the interstellar medium. With a motivation to bring resolution to the current lack of atomic and molecular data for such a vital process, we have applied the multi-channel Landau-Zener approach to quickly provide charge exchange data for any single electron capture system. By

implementing the resulting nlS-resolved cross sections into a cascade model for X-ray emission, we are able to generate theoretical emission lines and spectra for charge exchange. With this data, we pursue the application of such charge exchange data to modeling the X-ray emission of Comet C/2000 WM1 (linear). Further, sulfur charge exchange data is applied to develop a model that explains the anomalous ~3.5 keV emission line in nearby galaxy clusters that was previously attributed to dark matter. This work was performed in collaboration with R. S. Cumbee, D. Lyons, P. C. Stancil, B. J. Wargelin, L. Gu, and J. Kaastra. Work at UGA was partially funded by NASA grant NNX13AF31G.

Investigation and Structural Inhibition of Rce1 and Ste24 Activity in a Prokaryotic System

Rohit Munagala, CURO Research Assistant
Dr. Walter Schmidt, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

There are two major CAAX proteases – Rce1 and Ste24. The protease Rce1 is involved in post-translational modification mechanisms in eukaryotes and has unknown functions prokaryotes. In eukaryotes, Rce1 is involved in the CAAX modification pathway where it cleaves the –AAX terminal sequence of GTPase enzymes such as RAS oncological proteins. Rce1 is considered an anticancer target because of its role in modifying RAS. Inhibition of Rce1 can potentially obstruct the function of RAS and prevent tumor formation. The functional roles of Ste24p in eukaryotes and prokaryotes is less well understood. Research in the Schmidt lab investigates the target site specificity of Rce1 and Ste24 in an effort to contrast the activities of the two proteases. The goals of this project are to develop activity assays for prokaryotic Rce1 and Ste24. These assays will be invaluable for contrasting the activities of the prokaryotic enzymes from their eukaryotic counterparts. Orthologs of Ste24 and Rce1, HtpX and MmRce1 respectively, were subcloned into an expression vector, transformed into *E. coli*, and over-expressed. Membrane fractions with these enzymes will be used in *in vitro* assays typically used to monitor the eukaryotic enzyme activities. Such assays will be useful for testing structure-function hypotheses related to novel Rce1 inhibitors and for evaluating novel functional properties recently assigned to Ste24. Long term medical applications of this project include anti-cancer drug developments.

White Matter Structure Differs between Schizophrenia and Healthy Comparison Groups as a Function of Cognitive Control and Age

Megan Murphy, Ramsey Scholar, CURO Summer Fellow
Dr. Jennifer McDowell, Psychology, Franklin College of Arts & Sciences

Advances in neuroimaging have allowed researchers to study neural correlates of schizophrenia (SZ) *in vivo*. Despite contributions to the understanding of these correlates, neuroimaging studies have shown mixed findings regarding white matter (WM) abnormalities related to SZ. Some suggest discrepancies in findings may be due to heterogeneity of patient characteristics, such as variations in cognitive characteristics and age; a high level of cognitive control (CC) in healthy comparison groups may bias the results to differences in CC rather than the disease process of SZ, and WM follows a quadratic trend as age increases but differs between the healthy population and SZ. Poor CC is a hallmark behavioral trait of SZ and is likely related to WM abnormalities. Deficits in CC are not solely associated with SZ; a subset of the healthy population shows similar deficits. Given these potential confounds, this study aimed to explore the effects of CC and

age on WM comparisons between SZ and healthy subjects. Using diffusion tensor imaging, WM integrity was analyzed and compared between SZ and two healthy comparison groups with either high (HCC) or low (LCC) levels of CC, ages 20 to 50 years. The results showed differences in WM integrity depended on both CC capacity and age of the control group, with significant differences between HCC and SZ in the 41 to 50 age range. These results are important with respect to selecting appropriate control groups for psychiatric studies—future studies must control for both differing levels of CC and age.

The Role of Trehalose-6-Phosphate Synthase in the Development and Transmission of *Cryptosporidium parvum* Oocysts

Emily Myers
Dr. Boris Striepen, Cellular Biology, Franklin College of Arts & Sciences

Cryptosporidium is an apicomplexan parasite that infects the gastrointestinal tract of many animals. Cryptosporidiosis is the second leading cause of severe diarrhea in young children worldwide. No vaccine exists for cryptosporidiosis, and the only approved drug does not benefit those most in need of treatment—immunocompromised individuals and young children. Our lab developed tools to genetically modify *Cryptosporidium* using CRISPR/Cas9, and we developed a mouse model of infection. We can use these tools to better understand parasite biology and pathogenesis. We are interested in studying the oocyst, the transmissive life cycle stage of *Cryptosporidium*. The oocyst is a thick shell composed of proteins, lipids, and sugars that protect parasites from environmental stresses. One of the predicted components of the oocyst wall is trehalose, a dimer of glucose. Trehalose protects against desiccation in many organisms and is a virulence factor in *Mycobacterium* and *Cryptococcus*. We predict that this sugar plays similar roles in *Cryptosporidium*. In *Cryptosporidium*, trehalose-6-phosphate synthase (*t6ps*) catalyzes the final two steps of trehalose synthesis. Using our CRISPR/Cas9 and mouse infection model, we failed to generate a *t6ps* parasite knockout, suggesting that this gene is essential for parasite survival. We endogenously epitope tagged *t6ps* and observed cytosolic localization throughout the life cycle, with increased expression during oocyst development. To verify the biochemical function of *t6ps*, I am performing a genetic complementation test in *Saccharomyces cerevisiae* and *Escherichia coli* mutants lacking the orthologous gene. The results indicate a crucial role for trehalose in oocyst development and transmission, so this enzyme could make a novel drug target.

The Determination of Sunflower Growth in Different Genetic Lines and under Various Nutrient Conditions

Morgan Najdowski, CURO Research Assistant
Dr. Lisa Donovan, Plant Biology, Franklin College of Arts & Sciences

Modern agriculture techniques commonly use excess amounts of fertilizers to grow crops, in both infertile and fertile soils, despite ineffectiveness past a certain threshold. In encouraging production of stress resistant crops, the amount of excess fertilizer used can be decreased and yield can be optimized under infertile conditions. This greenhouse study compared genetic lines of cultivated sunflower (*Helianthus annuus*) to determine which would have higher production across a variety of nutrient conditions, ranging from very nutrient poor to nutrient rich. One of the areas of emphasis in particular was discovering what traits are associated with plant performance and stress resistance in sunflowers. The traits of the most recent leaf (MRL) were analyzed using a variety of methods, including leaf area, thickness and strength. Data analysis is currently underway,

but we expect that the plants that are successful under higher levels of nutrient stress have physical traits that will optimize photosynthetic capability in their MRLs, leading to more efficient nutrient use and increased growth under such conditions. With this information, we can promote more sustainable crop production and enhance food security for people around the world, particularly in areas with infertile soils and limited economic resources.

Examining Intercellular Heme Transport via Freixenet Transgenic Zebrafish

Monisha Narayanan, CURO Research Assistant
Dr. Amy Medlock, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

It is currently thought that every cell in the human body produces its own supply of heme, an essential molecule required for many biological processes. However, recent data suggests that heme may actually be transported intercellularly and utilized by cells. To test this hypothesis, we are generating transgenic wild-type and heme-deficient (freixenet) zebrafish, which synthesize heme in specific tissues, to elucidate the role of putative heme transporters in growth and development. My role in this research is to genotype, via PCR, homozygous freixenet transgenic fish which are ferrochelatase null, thus lacking a crucial enzyme in the heme biosynthesis pathway. This will allow me to identify their inheritance patterns and assess their ability to survive. The goal is to rescue heme-deficient fish by instigating heme production in red blood cells and liver tissue, showing that heme can be transported and utilized by other body cells. As of yet, we have not found an adult fish rescued by the transgenes, but we are continuing to genotype fish of this line. Additionally, I began a crossing scheme to assess the heme rescue capability of these genes in freixenet zebrafish, comparing the offspring mortality rates with those associated with specific genotypes. I anticipate that these mortality rates will correlate with the proportion of freixenet fish without the heme rescue gene insert. The data obtained in these studies will be used to validate the rescue of heme-deficient zebrafish and heme trafficking for utilization, either confirming or refuting the existing scheme of thought on heme transport.

Examining the Relation between Stigma and Self-Esteem, Self-Efficacy, and Social Satisfaction in Young Adults with Autism Spectrum Disorder

Margaret Naughton
Dr. Ashley Harrison, Educational Psychology, College of Education

There is mounting evidence demonstrating the negative impact of stigma experienced by parents of children with autism spectrum disorder (ASD; Gray, 2002; Farrugia, 2009; Mak & Kwok, 2010), but much less research has investigated the consequences stigma has on the diagnosed individual. The current study examines the negative outcomes of stigma among five young adults (M = 21.54 years, range = 18.59-25.35 years) diagnosed with ASD by assessing the relationship between experienced stigma and social outcomes such as self-esteem, self-efficacy, and social satisfaction. Stigma was assessed using an adapted version of Stigma Scale (King et al., 2007). The participants also completed psychometrically supported measures of self-esteem, social satisfaction, and adaptive social skills. The relations between stigma and social outcome variables were examined by correlational analyses. Analyses revealed that young adults that have more experiences with stigma have lower self-esteem (r = .824, p = .043), and perceive more social hostility from others (r = -.826, p = .042). As rates of ASD continue to rise, more young adults with ASD will attend college or enter the workforce. They will likely

experience stigma and it is important to know how these experiences impact quality of life to determine how to best support young adults with ASD in these environments.

Cognitive-Behavioral Therapy for Adults with ADHD: A Meta-Analysis

Nicole Negri
Dr. Jason Nelson, Psychology, Franklin College of Arts & Sciences

Although empirical investigation of pharmacological treatment options for adult Attention-Deficit/Hyperactivity Disorder (ADHD) has indicated positive results, there is also evidence that medication alone is insufficient for many adults with ADHD. Approximately 20% to 50% of adults with ADHD are not responders to medication. Several nonpharmacological interventions have been developed and empirically investigated, but cognitive-behavioral therapy (CBT) has received the most empirical attention. The purpose of this current study was to conduct a meta-analysis to determine the efficacy of CBT in the treatment of adults with ADHD. To locate relevant studies, we searched a variety of psychology-related databases (e.g., PsycINFO). Inclusion criteria were that studies (a) used a group design (i.e., no case studies), (b) used adult participants formally diagnosed with ADHD, (c) implemented CBT as a treatment option, (d) had a control group, and (e) reported statistics necessary for calculating effect size. Of the 122 studies reviewed, 10 met these criteria. For these studies, we examined the effect of CBT on ADHD symptoms and emotional functioning. The overall effect size for ADHD symptom reduction was statistically significant ($z = 5.02$, $p < .001$) and medium in magnitude ($d = .76$); Improvement in emotional functioning was also statistically significant ($z = 3.87$, $p < .001$) and medium in magnitude ($d = .54$). The significance of this study lies in its findings that CBT is a promising treatment option for adults with ADHD. CBT participants demonstrated both improvement of ADHD symptoms and emotional functioning.

Alpha-Tocopheryl Succinate Encapsulated Nanoparticles for the Enhancement of Mitochondrial ATP Production

Noah Newman, CURO Research Assistant
Prof. Shanta Dhar, Chemistry, Franklin College of Arts & Sciences

Mitochondria are the energy-producers of animal cells, converting chemical energy stored in the bonds of organic compounds into adenosine triphosphate (ATP), the main energy source for many of the human body's metabolic processes. While the body manages the rate of ATP production, it is of particular interest to find ways to stimulate ATP production in the mitochondria to increase the amount of available energy for the cell, without harming the cell in the process. A biodegradable polymer, PLGA-b-PEG-TPP derived from FDA approved polymers polylactide-co-glycotide (PLGA), polyethylene glycol (PEG), and a mitochondria targeting ligand triphenylphosphonium (TPP) cation which is used in FDA approved drug MitoQ has the ability to self-assemble into a nanoparticle (NP) with the ability to enter mitochondria due to their surface charge and size. This nanoparticle has demonstrated extraordinary abilities to encapsulate a variety of therapeutic agents and deliver to the mitochondria of cells in a controlled release fashion. A recent study from our lab has shown that *alpha*-tocopheryl succinate (*α*-TOS), a mitochondria-acting chemotherapeutic, increases ATP production in the mitochondria of cells. This research shows the nano-encapsulation of *α*-TOS in PLGA-PEG NPs with both targeting and non-targeting functional groups, the characterization and stability of the NPs, the cytotoxic effects of the NPs on various cell lines, and the energy-generating effects of the

NPs. Further studies will focus on the effects of these *a*-TOS-PLGA-PEG NPs on the energy production of other living systems.

"I Just Wanted a Roof over My Head": Possible Housing Solutions for Asylum-Seekers in Germany

Katherine Nichols
Dr. Katie Chapman, Germanic & Slavic Studies, Franklin College of Arts & Sciences

Since January 2015, over 1.1 million refugees have entered Germany seeking asylum after news spread of Angela Merkel's open door policy. Predominantly of Syrian origin, displaced people are making their way to Europe to escape war torn homes. In the wake of this massive refugee influx, Germany is seeking creative ideas to provide more housing. The most controversial housing strategy to date has been the attempt of a couple German cities to accommodate refugees in former outposts of concentration camps. I suggest living arrangements and reforms which would provide ethical shelter for refugees. Having created three policy proposals and examined their theoretical strengths and weaknesses as they related to effectiveness, cost, and decency, I will propose a final policy which includes both restrictions on living arrangements that could be viewed as unethical as well as guidelines for transforming alternate locations for refugee use. I will argue this policy to be superior due to its relatively low cost, high degree of effectiveness, and its ability to maintain respect for the human dignity of refugees.

The True Cost of Medical Credit Cards on Patient Credit Scores

Madison Nichols, CURO Research Assistant
Dr. Brenda Cude, Financial Planning, Housing & Consumer Economics, College of Family & Consumer Sciences

The purpose of this research was to discover if using a medical credit card to pay off medical costs and procedures could positively or negatively affect a patient's credit score. A medical credit card mostly functions as a traditional credit card; the patient takes out a loan to cover the cost of medical care and then pays back the debt over time. However unlike traditional credit cards, medical credit cards use a deferred interest system, which results in the patient owing interest on the entire amount if the patient does not make the minimum monthly payments or pay off the debt during a zero percent promotional period. The first research phase included actively visiting medical providers in order to obtain the information presented to patients when inquiring about using medical credit cards as a form of payment. Additionally, online research of scholarly journals, reports from consumer organizations, and forms of primary literature were also consulted to gain knowledge about the effects of medical credit cards, and other medical debt, on credit scores. The second phase involved contacting the medical credit card companies identified in the first phase to learn if they report to credit bureaus and, if they did, we contacted credit scoring companies to learn if they considered medical credit card use in building credit scores. Based on gathered information we were able to determine how using a medical credit card to pay for a patient's incurred medical care bill could be beneficial or detrimental to their credit score.

Role of Human Intelectin-1 in the Innate Immune System

Brennan Ninesling
Dr. J. Michael Pierce, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Although its exact biological function and involvement in the human innate immune system are still unknown, HL-1, a homolog of XL35 and member of the X-lectin family, has been shown to have affinities for ribose as

well as galactofuranosyl residues. The affinity for galactofuranosyl residues is significant due to its presence on many bacterial cell walls. Some of the X-lectin family members have been shown to bind to other carbohydrate residues on bacterial pathogens, although the specific binding mechanisms and exact functions are unknown. HL-1 is expressed in human embryonic kidney (HEK) cells transfected with HL-1 cDNA in pTracer vector and secreted into the medium. To test whether HL-1 interacts with macrophage and bacteria, it was first isolated from the medium. Using affinity chromatography, HL-1 was purified and then used in binding assays to show whether it effectively bound to macrophage cells. The purity of the HL-1 samples isolated from the medium was confirmed by polyacrylamide gel electrophoresis followed by silver staining. Future research will help reveal the ligand-binding specificities used by HL-1 as a part of the innate immune system.

Re-evaluating Proposed Identities of *Brooksella alternata* of the Conasauga Shale of Georgia and Alabama

Morrison Nolan, Foundation Fellow
Dr. Sally Walker, Geology, Franklin College of Arts & Sciences

Brooksella alternata is putatively an important fossil of the middle Cambrian Conasauga Shale of Georgia and Alabama, USA, but its identity remains obscure. It has been variously identified as a jellyfish, multiple trace fossils, a concretion, and most recently a silica sponge (hexactinellid). Each of these identifications remains tentative. I examined and quantified the external and internal morphology, chemical composition, and in situ orientation of *Brooksella* in sediments to reevaluate these proposed identities. If a hexactinellid sponge, *Brooksella* would be expected to exhibit oscula, ostia, internal structures, and arranged spicules. After considering external morphology, computer assisted tomography of internal structure, and the geochemical and electron microprobe analysis of *Brooksella*, I found the evidence is not consistent with a sponge interpretation. Previous chemical examination of *Brooksella* has dealt largely with bulk composition; my analysis is more targeted, analyzing specific internal features of the specimens. Several weathering features, including the role of modern lichen and plant roots in modifying the surface of *Brooksella*, could have produced ostia-like features. Thin sections of the samples have not yielded unambiguous spicules, but they have shown many signs of root or hyphae weathering and possibly spores worked into the samples' interiors. My results indicate that *Brooksella* is incompatible with previously proposed identities and call into question the identity of other suggested Cambrian sponges of similar composition and structure.

How the Market Responds to Changes in Firm Health Policy

John-Jordan Nunnery
Dr. Sara Holland, Banking & Finance, Terry College of Business

With the costs of US healthcare growing faster than the economy, firms are taking novel approaches to manage healthcare coverage for their workforce. In this paper, I study the market's reaction to firms' announcements to invest or disinvest in employee healthcare. Using a set of 63 events classified as expansions, reductions, restructurings, and acknowledgement, I find that on average the market responds negatively to changes in healthcare policy. It responds less negatively when the firm market value and dividend yield are large, and it responds more negatively when the firm has a larger employee base and current ratio. Additionally, I find that restructuring events lead to significantly steeper declines in equity value. These findings have implications for the efficient market hypothesis and investor myopia.

Abstracts

Investigations of How *Lysinibacillus sphaericus* Bin Toxin Kills a Cell Line Derived from the Malarial Mosquito *Anopheles gambiae*

Onyinyechi Ochiobi, CURO Research Assistant
Prof. Michael Adang, Entomology, College of Agricultural & Environmental Sciences

Binary toxin (Bin) produced by the bacterium *Lysinibacillus sphaericus* is toxic to *Culex* and *Anopheles* mosquito larvae. It has been used world-wide for the control of mosquitoes that vector human diseases, including West Nile virus, lymphatic filiariasis and malaria. The Bin toxin interacts with a receptor in the gut of *Anopheles* mosquitoes. However, the exact mechanism of its mode of action is not clearly understood. The Adang laboratory developed an *Anopheles gambiae* Ag55 cultured cell line as a model for investigating the molecular action of Bin toxin. The Bin toxin, composed of BinA and BinB proteins, internalizes and kills the Ag55 cells via a process that is consistent with autophagy. The goal of this project was to determine whether BinA or BinB alone is sufficient to kill *A. gambiae* larvae and Ag55 cells or whether the BinA/B pair is required for toxicity. Our approach was to individually produce BinA and BinB in recombinant *Eschericia* coli and test the toxicity of each separately and together against *A. gambiae* larvae; followed by testing the cytoxicity of BinA and BinB against Ag55 cells. Preliminary results with purified BinA alone show toxicity to Ag55 cells and now we are beginning to analyze uptake of BinA by the cells. This information will contribute to the understanding of how Bin toxin kills mosquito larvae, and could provide insights into approaches to prevent mosquitoes from acquiring Bin resistance.

The Effect of Corporate Wellness Program Benefits Over Time on End-Of-Workday Strain

Selin Odman, CURO Summer Fellow
Lindsey Murry
Dr. Malissa Clark, Psychology, Franklin College of Arts & Sciences

In the current study, we examined changes in employee well-being by assessing employee perspectives of their organization's wellness program. We asked employees to rate their perceived change in medication use, weight, and eating habits since joining the wellness program. We then examined how these measures related to end-of-workday strain, which is based on how physically, mentally, and emotionally drained employees feel. To conduct a longitudinal study, surveys were administered in 2012-2013 and 2015 to employees undergoing a wellness program at a utility company in the Southeastern United States. We hypothesized that the composite of benefits from the wellness program is positively related to a decrease in end of workday strain from time 1 (2012-2013) to time 2 (2015). Our sample *(N*=78) consist of 65% males, with a mean age of 45.6. Of 78 the employees who complete both time 1 and time 2 surveys, 55% reported working inside while 45% reported working outside. On average, employees worked 42.3 hours per week. We ran a simple regression using R software to test whether the composite and individual benefits from the wellness program predicted change in strain by time 2. With the variables measured on a five-point likert scale, the mean of the composite program benefits was 3.5 *(sd = 0.53)* and the mean of healthy eating habits was 3.71 (*sd = 0.69)*. The average change in end of workday strain was 0.427 (*sd = 0.824)*. The results of the regression were not statistically significant: $F(1,76)(=0.02$, $p > .05$). We will perform additional analyses examining the facets of end of workday strain (physical tiredness, mental tiredness, and tenseness).

Structural Characterization of an LTTR in *Acinetobacter baumannii*

Kikachukwu Okolo, CURO Research Assistant
Dr. Cory Momany, Pharmaceutical & Biomedical Sciences, College of Pharmacy

Bacterial transcriptional regulators such as the LysR-type transcriptional regulators (LTTR) are responsible for controlling many biological processes in different bacteria. Therefore understanding how these transcriptional factors function is important in the development of drugs that could target these proteins. This project is focused on elucidating the structural interactions between LTTRs and their various ligands, the DNA to which they bind, as well as the RNA polymerase that they interact with during transcription in the bacterium, *Acinetobacter baumannii*. *A. baumannii* is an opportunistic clinical pathogen that causes urinary tract infections and biofilm formation on plastics. Because of *A. baumannii's* ability to form a biofilm, *A. baumannii* is resistant to many classes of antibiotic drugs by intrinsic and acquired antibiotic resistance genes. One of the genes is *bfmL*, which encodes an LTTR that is responsible for controlling the expression of the chaperone-usher pilus assembly system needed for cell attachment and biofilm formation. The *bfmL* gene was PCR amplified and successfully cloned into an in-house engineered expression vector. A restriction digest confirmed that the cloning was successful, and the resulting plasmid was transformed into a protein production strain of *E. coli*. Preliminary results on the purification of the protein by metal-chelate chromatography indicate that the protein is poorly soluble. After improving the solubility of the protein, biochemical analysis and crystallization studies will be initiated. Successful crystallization of this protein and other LTTRs will pave the way for understanding their structures, which is a critical step in developing novel antibiotics targeted at *A. baumannii*.

Coalitional Stability: Apportioning the Legislature at the U.S. Constitutional Convention

Robert Oldham, CURO Research Assistant
Dr. Keith Dougherty, Political Science, School of Public & International Affairs

Principles of legislative apportionment determine the number of seats each state receives in Congress. Apportionment was one of the issues most fiercely debated at the U.S. Constitutional Convention of 1787. States small and large, free and slave, and poor and wealthy squabbled over the constitutional principle that would decide what interests would control Congress. Delegates eventually agreed to apportion the House by the number of free inhabitants plus three-fifths of the slave population and the Senate by equal state voting. However, there were nearly twenty other principles of apportionments that were proposed and debated. Assuming delegates wanted to maximize their state's vote share, we examine which principles of apportionment were coalitionally stable. We do this by comparing vote shares of all the principals proposed, both for a unicameral or a bicameral body. This allows us to ask whether the apportionment principle adopted was in equilibrium among those considered, to identify principles which dominate those enumerated in the Constitution, and to provide clear examples of vote cycling. Our research suggests that the coalitions that formed around different apportionment methods were unstable and that the adopted principle was not inevitable. Instead, it was a compromise between competing interests who, perhaps unknowingly, sowed the seeds of the American Civil War by over representing the south in the new republic.

Sensitive Liquid Chromatography/Mass Spectrometry Method for the Determination of the Lipophilic Anticancer Drug in Rat Plasma

Oluwasegun Olorunyolemi, CURO Research Assistant
Dr. Michael Bartlett, Pharmaceutical & Biomedical Sciences, College of Pharmacy

In this research study, a robust and sensitive liquid chromatography mass spectrometry (LC-MS) method was developed and validated to measure a preclinical candidate GH501 in rat plasma. This compound has been developed for the treatment of bone metastatic prostate cancer. GH501 was samples were prepared using liquid-liquid extraction and separated on a Waters AtlantisTM dC-18(30 mm x 2.1 mm i.d., 3 μm) column using a mobile phase of acetonitrile/20 mM ammonium formate (pH 4.25 adjusted with formic acid) with gradient elution. GH501 was detected in positive ion mode using MRM (multiple reaction monitoring). The MS response was linear over the concentration range from 0.4 – 200 ng/ml in plasma. The limit of detection (LOD) and quantitation (LOQ) were calculated from the peak-to-noise ratio as 0.2 and 0.4 ng/ml respectively. This method was validated based on FDA guidelines, and the measured signal was shown to be precise, accurate, and linear over the concentration range tested.

Tolstoy's Second Epilogue: On Page and Screen

Katherine Opacity, CURO Research Assistant
Dr. Charles Byrd, Germanic & Slavic Studies, Franklin College of Arts & Sciences

The breadth of Leo Tolstoy's *War and Peace* may indeed mean that the novel's plot and plentiful characters cannot be condensed to yield a faithful, abridged version. Tolstoy himself, however, captured the spirit of his work perhaps most completely in its final section: the second epilogue. Lacking any narrative structure, Tolstoy divulges his philosophy of history, including most notably a discussion of the struggle between free will and determinism, the nature of consciousness, and the essence of time. Such impenetrable subjects may leave readers and filmmakers alike wondering about the plausibility of including it in an adaptation. Sergei Bondarchuk, in his 1966 film version, successfully incorporates this portion of the novel. Bondarchuk's epic eight-hour film evokes the epilogue in both fundamental and nuanced ways. Film itself, I argue, is a most suitable medium for the epilogue. On a secondary level, camera techniques and stylistic choices of the director together reproduce one of Tolstoy's central philosophical struggles: reconciling immensity and fragments - of time, man, and existence.

Investigating a Potentially Novel Cache Valley Virus Variant in a Clinical Case in Missouri

Isabel Ott, CURO Honors Scholar
Dr. Daniel Mead, Population Health, College of Veterinary Medicine

The Southeastern Cooperative Wildlife Disease Study (SCWDS) investigates wildlife mortality events in the southeastern United States. In July of 2015, the Missouri Department of Conservation submitted samples from a white-tailed deer (*Odocoileus virginianus*) that was euthanized after showing signs of hemorrhagic disease. A virus isolated from submitted samples tested negative for hemorrhagic disease viruses and other major viruses of white-tailed deer using reverse transcriptase polymerase chain reaction (RT-PCR). Further tests detected an orthobunyavirus, a genus of arthropod-borne RNA viruses distributed worldwide. While exposure to several orthobunyaviruses has been detected in white-tailed deer, they are not known to cause disease in white-tailed deer, though they cause acute disease in other ruminants. Two orthobunyaviruses, Cache Valley and Potosi viruses, have been previously isolated from deer in Missouri; as RNA viruses, they lack proofreading mechanisms and frequently exchange genetic

material. The unusual clinical presentation of this case was seen as potentially resulting from infection with a mutant or hybrid orthobunyavirus capable of causing illness in deer. In order to explore this possibility, RT-PCR reactions were conducted to amplify partial segments of the virus's genome; these segments were then sequenced. Comparative analysis of the sequence data showed high similarity between this case and Cache Valley virus. Conclusive identification is still being pursued; orthobunyavirus species are often closely related and few reference sequences are available to compare experimental sequence results to. Further investigation will endeavor to sequence more of the viral genome and explore how the virus's structure and function are impacted by identified mutations.

To Close or Not to Close for Severe Winds: Two Cable-Stayed Bridges in the Georgia Coast Region

Maximillian Ovett
Dr. Mi Geum Chorzepa, College of Engineering

The ultimate goal of this research is to understand and model the behavior of the two cable-stay bridges, the Eugene Tallmadge Bridge located in Savannah, GA and the Sidney Lanier Bridge in Brunswick, GA and to propose to the Georgia Department of Transportation the criteria for closing the bridges to traffic. A cable-stayed bridge is readily open to the excitation forces of the wind. These aerodynamic forces result in vibrations emanating throughout the bridge-deck and cables. Once these vibrations reach a specific threshold, they can cause torsional divergence, flutter, galloping, and ultimately self-destruction. These two bridges are of similar structural nature were each has 2 main support towers and 2 planes of tension cables supporting the pre-stressed concrete bridge-deck. Due to the location of theses bridges being near the coast they are constantly under wind loading as well as in the direct path of hurricanes. The need to model and understand their performance and general cable-stayed bridge behavior in peak winds and large scale hurricanes is pertinent. These analysis and models will help further wind-resistant designs of cable-stayed bridges. This semester's research will focus in on understanding the underlying structural dynamics of cable-stayed bridges and their supporting structures. This will primarily be done through the review of published literature on the subject of bridge, wind, and vibration analyses. The study will be focused on conceptual understanding of modal vibrations, torsion, wind analysis, and flutter. If understanding and time allow, a simple model of one of the bridges may be built to validate conceptual understanding.

Exploring Uncertainty in Models of Mosquito Vector-Borne Disease

Jack Owen
Dr. Courtney Murdock, Infectious Diseases, College of Veterinary Medicine

Understanding the dynamics of the spread of mosquito-borne diseases such as malaria and dengue virus are important public health challenges as these diseases affect millions of people around the world. Mosquitos, like most ectotherms, are heavily influenced by the temperature of their environment. Recent work suggests that mosquito traits follow a unimodal response to temperature, with an "optimal range" in the middle that decreases as the temperature moves in either direction. Global climate change data indicate that different parts of the world may move into the mosquitos' optimal range in the coming years, changing the prevalence of mosquito-borne illnesses in those areas. Because mosquitos are prevalent in many hot, humid areas, little work has been done to investigate which factor is more responsible for mosquito transmission potential. This experiment will use a factorial design to monitor mosquito

mortality, bite rate, and fecundity across a range of humidity and temperature points. From the results, we will be able to further specify which variable is the more important driver of mosquito transmission potential.

Wild Bearded Capuchins (*Sapajus libidinosus*) Use Tools in Fazenda Boa Vista, Brazil: Positioning the Nut Predicts Success

Rachel Pack
Dr. Dorothy Fragaszy, Psychology, Franklin College of Arts & Sciences

What challenges capuchins learning to crack nuts? Prior studies showed that adults position (place) nuts precisely on anvils, often several times, before each strike, and that positioning the nut is the last feature of nut-cracking to appear in juveniles. We predicted that positioning the nut on the anvil would index juveniles' mastery of nut-cracking. We observed fourteen capuchin monkeys (eight juveniles - four that could crack nuts, four that could not - and six proficient adults) using continuous focal animal sampling during 2011-2013. After extracting episodes in which monkeys struck nuts, we examined correlations among the duration of cracking episodes, rate per episode of positioning a nut on an anvil, age and success at opening a nut. We found a positive correlation between juveniles' age and rate of positioning a nut ($r = +0.57$, $n = 8$, $p=.021$). Rate of positioning correlated positively with success for the juveniles that cracked, significantly for two of them. The rate of positioning a nut increased from juveniles who could not crack, to juveniles who could crack, to adults (mean=0.7, 2.3, 3.4 times/min). Coefficient of variation for rate of positioning the nut is highest in juveniles who cannot crack (CV=140, cannot crack; CV=11 and 24, can crack and adults). Consistently positioning the nut appears to be a key feature predicting efficient nut-cracking in young capuchins.

Psychiatric Drug Use and the Business Cycle

Meredith Paker, Foundation Fellow, CURO Research Assistant
Dr. W. David Bradford, Public Administration & Policy, School of Public & International Affairs

Previous literature suggests that many indicators of health improve during recessionary periods. This countercyclical health effect has been attributed to increases in leisure time due to lower employment, which can reduce job-related stress and permit higher investment in healthy lifestyle changes. However, earlier work by David Bradford and Bill Lastrapes finds that psychiatric drug utilization increases during recessions, suggesting that mental health is largely procyclical. Using the Medical Expenditure Panel Survey data from 1996-2012, we explore how changes in employment affect psychiatric drug utilization. We aim to understand the mechanism behind any increases in drug utilization due to the business cycle.

Effect of Different Concentrations of 25-Hydroxycholestrol on Osteogenic Differentiation of Mesenchymal Stem Cells (MSC) from Broiler Compact Bone

Daye Park, CURO Research Assistant
Dr. Woo Kyun Kim, Poultry Science, College of Agricultural & Environmental Sciences

MSC are multipotent progenitors that can differentiate into various tissue cells. The objectives of the study were to 1) isolate MSC from broiler compact bone and 2) study the effects of 25-hydroxycholestrol on osteogenic differentiation of MSC. This is important for the production and welfare facets of the poultry industry as chickens develop orthopedic problems such as lameness, tibial dyschondroplasia, and osteoporosis. MSC were isolated from the femurs and tibia of day-old chicks. The compact bones were

flushed with PBS, chopped to small pieces, and digested with a digestion buffer containing 0.25% collagenase and 20% Fetal Bovine Serum (FBS). Digested cells were filtered, centrifuged, and cultured in a growth medium DMEM containing 10% FBS. MSC were successfully isolated and left to confluent, with the media changed every 2-3 days. The cells were passaged until P4 and plated in 24 well plates at density of 20,000 cells/cm2. Upon confluency, cells were treated with the following treatment: control, osteogenic media (OM), and OM with 0.5, 1, and 2 uM 25-hydroxycholesterol. Cytochemistry was conducted on day 7 and 14 to detect osteogenesis. Cells treated with OM, and 25-hydroxycholestrol induced higher proportion of Alizarin Red and Von Kossa stain (mineralization), and Alkaline Phosphatase (early osteogenic marker) compared to control cells. However, 2uM 25-hydroxycholesterol was toxic to cells, causing cell death. Results indicated that 25-hydroxycholesterol has a stimulatory effect on MSC ostegenesis. Current results provide rationale for further study on regulatory mechanisms of 25-hydroxycholesterol on MSC which can help to address skeletal problems in poultry.

Genetic Analysis of *Exobasidium maculosum* Using Microsatellites

Sabrina Park, CURO Research Assistant
Dr. Marin Talbot Brewer, Plant Pathology, College of Agricultural & Environmental Sciences

Exobasidium maculosum is a recently described emerging fungal pathogen of blueberry in the southeastern USA. It causes leaf and fruit spots, with the latter resulting in unmarketable berries and economic losses. Previous studies showed an elevated level of genetic diversity based on the analysis of three loci: ITS, EF-1α, and CAL. This high level of genetic diversity, which is especially surprising for an emerging pathogen, is believed to have resulted from a combination of high mutation rates and recombination within populations. Our objective is to understand how this genetic diversity is hierarchically distributed within spots, leaves, bushes, fields, and regions. This information will provide information on the life cycle and dispersal of *E. maculosum*. To accomplish the objectives, we collected and genotyped 379 isolates from ten bushes in each of two different commercial blueberry fields in Georgia. Isolates were genotyped at ten loci using microsatellite markers. Spatial genetic diversity analyses and measures of population subdivision are currently underway. Results from this study will help us to understand the genetic basis disease emergence, as well as the life cycle and dispersal patterns of the fungus, potentially leading to improved disease management strategies.

Cytotoxicity of Gold Nanoparticles with Feline Injection Site Sarcoma, *In Vitro*

Arjun Patel, CURO Research Assistant
Dr. Robert Gogal, Anatomy & Radiology, College of Veterinary Medicine

Injection site sarcoma (ISS) is an aggressive cancer associated with vaccination in felines. ISS is locally invasive and can be difficult to control even with aggressive therapy. The focus of this study was to assess whether 15 nm gold nanoparticles could be employed as a cytotoxic agent. Nanoparticles have an increasing usage in numerous fields due to size and biological properties they possess. The study focused on culturing ISS cells with gold nanoparticles at 0.0, 0.25, 0.5, 1.0, 2.0, and 4.0 mM for 72 hr. Changes in cell proliferation, viability, and cytology were assessed. The data obtained suggested that gold nanoparticles concentration yielded an inverse correlation with ISS cell proliferation. Plating 5,000 ISS cells per well in a 96 well tissue culture plate, an IC 25 was determined to be 3 mM concentration. Results from this preliminary study suggest that 15 nm gold

nanoparticles at concentrations greater than 3 mM can induce cytotoxicity in ISS cells.

The Implications of International Intellectual Property Law on Global Access to Medicines

Ashka Patel, CURO Summer Fellow
Dr. John Dayton, Lifelong Education, Administration, and Policy, College of Education

The affordability of medicines remains an issue both in economically resilient countries such as the U.S. and in developing countries such as India. International intellectual property law and pharmaceutical patents complicate the matter. The balancing act between providing protection for innovation and honoring the universal right to health, including access to essential and life-saving medicines, creates controversy. One particular bilateral relationship, between the U.S. and India, has had a disproportionate effect on global access to medicines. The domestic intellectual property law of the U.S. and other developed countries was favored in the development of international law. Most notably, the TRIPS agreement demonstrates a global movement toward more rigorous intellectual property law. However, the pressure from major pharmaceutical companies in the U.S. to impose trade sanctions on India, as a result of the immense generic pharmaceutical industry built from the reverse engineering of drugs innovated in countries such as the U.S., France, the U.K., and Germany, directly contradicts the ostensible commitment to global health all of these countries have pledged. While respecting the concerns of domestically based pharmaceutical companies and maintaining protection of pharmaceutical patents, the U.S. must find a way to also defer to the interest of global health and access to medicines. India must find equilibrium between attracting foreign investment and continuing to create the generic medicines that are so vital for medically underserved communities globally.

Genetic and Metabolic Modeling the Methanogenic Archaeon *Methanococcus maripaludis*

Hirel Patel, Lucas Bougang, Rebecca Buchanan, John Buchanan
Dr. William Whitman, Microbiology, Franklin College of Arts & Sciences

Methanococcus maripaludis is a model organism for Archaea, which affords researchers the opportunity to take advantage of beneficial qualities such as (1) production of methane to be used as a biogas and (2) manufacturing high volumes of isoprenoids to be used as precursors for high-value biochemicals. However, there are few genetic tools for metabolic engineering available for Archaea. Our goal is to create, characterize, and model some useful tools for the utilization of this adept organism for synthetic biology. Building on our past *M. maripaludis* projects, which created and characterized a mCherry reporter system as well as a recombinant mutant making the high-value isoprenoid geraniol, our team is now working to (1) create, characterize, and model a ribosome-binding site (RBS) library using the mCherry reporter system and (2) model geraniol production of the recombinant *M. maripaludis* using flux balance analyses. Preliminary results have shown varying levels of expression in our developing RBS library, as well as the determination of growth substrates that can increase the yield of geraniol production. Additionally, our team has initiated an Archaeal InterLab Study to further characterize the reproducibility of our mCherry reporter system.

Maternal Obesity and Trabecular Bone Microarchitecture in C57BL Mice

Kayla Patel, CURO Research Assistant
Dr. Richard Lewis, Foods & Nutrition, College of Family & Consumer Sciences

Diet-induced obesity has a negative impact on bone microarchitecture by decreasing trabecular number and volume. However, the effects of obesity during gestation on trabecular bone architecture are unclear. Studying the effect of obesity on bone in the context of gestation is of particular importance given that nearly 40% of women of childbearing ages are currently considered obese. The aim of this study is to analyze the effects of maternal obesity on trabecular bone microarchitecture in C57BL mice. Female mice were either provided a low fat diet (n=12) or a high fat diet (n=12) over a 6-week period and were then mated with males. Trabecular bone at the tibia distal metaphysis was analyzed at the 6-week time point and prior to delivery using micro-computed tomography. For simplicity, we present data on bone volume to total volume (BV/TV), one outcome of particular interest. There were significant main effects for both obesity ($F(1,10)=10.07$, $p=0.010$), and pregnancy ($F(1,10)=144.8$, $p<0.001$). The interaction effect was also significant ($F(1,10)=8.768$, $p=0.014$), demonstrating that the effect of obesity on BV/TV is evident only prior to gestation. Our data indicate that the high-fat fed obese mice had lower BV/TV compared to the low-fat fed mice during pre-pregnancy. However, given the robust negative effect of pregnancy on BV/TV, this likely explains the lack of diet-related BV/TV differences during gestation. These findings underscore the negative effect of excess adiposity and pregnancy on trabecular bone microarchitecture. Fetal and offspring musculoskeletal outcomes warrant consideration in future studies.

Investigating the Antiparasitic Activity of Cry5B Protein against Fourth-Stage Nematode Parasites

Nirali Patel
Dr. Ray Kaplan, Infectious Diseases, College of Veterinary Medicine

Helminth infections in humans and animals are a prominent concern due to their ability to impair health, well-being, and productivity. In livestock animals, the problem has become further amplified due the development of drug resistance which is reaching critical levels. One possible and novel treatment is the natural antiparastic protein, Cry5B, produced by the bacterium *Bacillus thuringiensis (Bt). Bt* is a spore-forming soil bacterium that produces a variety of crystalline (Cry) proteins. Cry5B has shown high potency against several important parasites in lab animal models, and it is hoped it also can be used as a natural antiparasitic to treat livestock. Cry5B must be ingested by the parasite to be active, however, pre-parasitic third-stage larvae (L3), which are typically used for *in vitro* drug screening, are a non-feeding stage and thus are not a viable experimental model. In contrast, L4 have fully developed GI systems, making the L4 stage ideal for an *in vitro* model for determining the efficacy of Cry5B. *Cooperia* spp. are the most common and important nematodes infecting young cattle and are the focus of this study. Recently, our lab has developed a culturing system that permits the development and molting of L3 *Cooperia* nematodes to the L4 stage. Exsheathed L3 are added to a nutritive media consisting of LB, NCTC, and fetal bovine serum, and are incubated at 39oC under 20% CO2. As the research progresses, the efficacy of Cry5B will be tested using L4 stage *Cooperia* in a series of in vitro drug assays.

Evaluation of Electric Twitch Endurance Index of the Lower Back Muscles

Sahil Patel
Dr. Kevin McCully, Kinesiology, College of Education

Our lab has developed an Electrical Twitch Stimulation Fatigue test which measures fatigue as a decrease in contraction velocity. Back pain and fatigue is a common and

debilitating clinical problem. The purpose of my study was to use an electrically stimulated muscle twitch test to measure fatigue in the erectors muscles of the lower back. Healthy males and females between the ages of 20-30 were tested. The electrodes were placed alongside the T12 and L1 vertebrae separated by 5cm to allow space for placement of the accelerometer. Subjects are in a seated position for this protocol which makes this test clinically applicable to the elderly and wheelchair bound. The testing protocol was 5 minutes of stimulation at a frequency of 4Hz using a tolerable current level. The fatigue of the muscle will be represented as an endurance index value. The endurance index is the difference between the maximum acceleration value and the end value. A frequency of 4Hz will cause fatigue in the muscle which can be measured by an accelerometer. A sample of 5 participants all resulted in a fatigued lower back erector (Mean = 25.2 +/- 12.25). I hypothesize a lower endurance index in the lower back muscles could be possibly correlated to conditions such as lower back pain or poor spine stability. An evaluation of the endurance index of the lower back muscles has the potential to be clinically relevant in identifying causes of lower back pain.

The Role of Dual Oxidase 1 in Tracheal Immunological Functions

Urmi Patel
Dr. Balazs Rada, Infectious Diseases, College of Veterinary Medicine

Life-threatening viruses such as the Influenza A virus (IAV) have the ability to wipe out multiple bodily functions and can therefore be fatal to one's health. The innate mechanism by which our body shows viral inactivation is connected to Dual Oxidase 1 and 2; major oxidases in the NADPH oxidase family that play a role in the production of hydrogen peroxide (H_2O_2) in tracheal airways through the activity of lactoperoxidase (LPO), thiocyanite (SCN^-) and iodide (I^-). LPO catalyzes the reaction between SCN^- and H_2O_2 to form hypothiocyanite ($OSCN^-$). A similar mechanism is seen with I^-. These reactive oxygen species play a major role in the production of H_2O_2, which lead to the inactivation of IAV. In order to test this, rat tracheal cells are harvested, grown and infected with the H1N2 strain of the virus in a mixture with the presence or absence of LPO, SCN^-, and I^-. The supernatants collected are then used to perform plaque assays on Madin-Darby canine kidney epithelial cells (MDCK) to measure the extent of inactivation of the virus. The data arrays to several log differences between inactivation in the systems without the 3 components (LPO, I^- and SCN^-) versus the systems with. Another comparison is made between the SCN^- and I^- systems to visualize which one forms a stronger response. The difference seen in the 3-component system could potentially hint to future studies that not only develop the knowledge of the Duox1 mechanism but also enhance applied research on the treatment of IAV.

Integration of Multispectral Imaging into UAS

Aaron Patrick, CURO Research Assistant
Dr. Changying Li, College of Engineering

Remote sensing devices will soon become common place in the field of agriculture, as unmanned aerial systems (UAS) are an incredibly efficient means of gathering crop data with high spatial and temporal resolution. Information such as canopy coverage, plant height, and normalized difference vegetation index can be gathered and processed to determine which genotypes of a species exhibit the most robust phenotypic traits. There are many UAS on the market that have integrated cameras, but few that have integrated multi-spectral cameras. Our challenge is to integrate a multispectral camera into a hobbyist aircraft that is light, compact,

and relatively inexpensive. This is accomplished through the use of a microcontroller that records data from sensors including an accelerometer, gyroscope, magnetometer, and barometer. The UAS will also collect GPS coordinates and calculate orientation data that will be used in conjunction with the multispectral images to create 3D models of crops. All flight data and images are recorded onto SD cards. This project entails the design and fabrication of vibration dampening mounting hardware for a multispectral camera, the integration of electrical components, and the coding of a microcontroller and image processing. The resulting data acquisition system can be incorporated into variety of commercially available unmanned aerial vehicles.

Photodissociation of CS from Excited Rovibrational Levels in Interstellar Environments

Ryan Pattillo
Dr. Phillip Stancil, Physics & Astronomy, Franklin College of Arts & Sciences

This research is focused on determining the abundance of CS molecules in various ultraviolet (UV) photon-irradiated interstellar (IS) environments. Photodissociation due to UV photons is a dominant molecular destruction process in a variety of UV-irradiated IS environments, so having reliable photodissociation rates for CS is necessary to accurately determine its abundance in these environments. While most astrochemical models adopt photodissociation rates computed from cross sections out of the molecule's ground rotational and vibrational (rovibrational) level (v=0,J=0), they also assume a standard local IS radiation field and opacity due to standard IS dust. However, none of these conditions are satisfied in a host of environments including photodissociation regions, protoplanetary disks, and outflows from AGB stars. To allow for the calculation of more reliable photodissociation rates, we compute cross sections from all bound rovibrational levels of the ground electronic state of the CS molecule. The cross sections are computed for a large number of excited electronic states using a two-state fully quantum perturbation approach. New *ab initio* potential energies and transition dipole moment functions, used in the photodissociation calculations, were obtained at the MRCI+Q level of theory using the quantum chemistry package MOLPRO. Applications of the rovibrational-state-resolved cross sections will be presented as well as LTE photodissociation cross sections which assume a Boltzmann distribution of initial rovibrational levels.

Keyword Extraction Using Artificial Neural Networks and a TextRank Variant

Justin Payan, Foundation Fellow
Dr. Bill Hollingsworth, Computer Science, Franklin College of Arts & Sciences

Keyword extraction is an important task in natural language processing that aids in information retrieval, document clustering, summarization, and many other useful endeavors. The task involves automatically selecting the most representative words and phrases from natural language documents. Most approaches consider all nouns and noun phrases as candidates, and a classification model determines which of those candidate keywords should be included in the set of selected keywords. Some of these classifiers have used linguistic information, some have used statistical information, and others use machine learning. We combine the linguistically informed approach with the machine learning approach to select keywords from scientific abstracts in the journals *Computers and Control* and *Information Technology*. The candidate keyphrases are classified by an artificial neural network, a variant of Mihalcea and Tarau's TextRank algorithm, or a combination of the two algorithms. We measure the precision, recall, and F1-score of

our algorithm as compared to previous results on this dataset. Our approach gives promising results.

Functions of the Discourse Marker *"Bon"* in Spoken French

Joy Peltier, Foundation Fellow
Dr. Diana Ranson, Romance Languages, Franklin College of Arts & Sciences

This study seeks to determine the pragmatic functions of the discourse marker *bon* and their frequency in spoken French. Discourse markers, such as English *well*, are often misconstrued as nothing more than fillers used in moments of hesitation (Hansen 1998:238). However, research in pragmatics reveals them to be a means of communicating the structure of a conversation or the speaker's attitude to the listener. For example, Barnes (1995:813) considers *bon* to be a marker of transitions appearing at "junctures or points of discontinuity," whereas Hansen (1998:254) considers it to mark an "undesirable discourse phenomenon." An analysis of 223 examples of this marker in the Corpus Montpellier-Rognes, composed of conversations recorded in 2005 and 2006 with 37 native speakers (22 women and 15 men), has revealed a set of finely distinguished functions of *bon* ranging from indicating the insertion of a quote, to highlighting a contrast, to introducing an opposing point of view. These functions call into question whether *bon* always marks a transition (Barnes 1995) or an undesirable discourse phenomenon (Hansen 1998). This study advances our understanding of *bon* by uncovering new pragmatic functions, refining those previously mentioned in the literature, and responding to proposals regarding its central purpose in discourse. Furthermore, it presents for the first time a quantitative analysis of the frequency of the various functions of *bon*.

Words That Lead and Words That Follow: Lexical Indicators of Leadership

Jacob Pendergraft, Parker Nayman, Fatima Koko, Christiana Agbonghae, Nikita Meka
Dr. Dorothy Carter, Psychology, Franklin College of Arts & Sciences

Tackling large-scale societal challenges often requires multiple teams from different disciplines, organizations, and geographic locations to collaborate using virtual collaboration tools communication. Arguably, *leadership* can have profound effects on the success of these systems. However, in complex multiteam contexts, leadership is often an informal social process whereby leaders emerge and exert influence through their interactions with others. Novel analytic techniques are now providing the means to capture interactions in virtual teamwork contexts and link these interactions with critical social processes such as leadership. In this study, we analyze the digital traces of social interactions among participants in a multiteam system laboratory task in order to identify word choices that indicate *leader/follower emergence.* In this task, 12 participants are randomly assigned to a specific role on one of four 3-member teams and are required to apply their role-specific information during a multiteam decision-making activity. Throughout the activity, all inter-team communication is restricted to an embedded text-based chat system. We analyze this body of text-based chat using a semantic analysis program called LIWC that examines the frequency of certain key words that fall under a specific construct or language style (e.g., affect or pronoun use). Finally, we use a class of inferential models of network emergence called *exponential random graph models*, which identify statistically significant antecedents of relationship emergence. This allows us to identify the lexical indicators that predict leadership and followership relationships between teammates.

3D Distribution of High Galactic Latitude Interstellar Clouds

Chance Pittman
Dr. Loris Magnani, Physics & Astronomy, Franklin College of Arts & Sciences

The Milky Way Galaxy is composed of stars, gas, dust, and dark matter. The gas component can take very different forms. There is a cold; molecular phase; a cold atomic phase; a warm atomic phase; a warm; ionized plasma; and a hot, ionized plasma. The cold molecular component is especially important because it is the material that forms stars. Most of the cold molecular gas in the Galaxy is tied up in large structures called molecular clouds, most of which are distributed along the Galactic plane. About 10 percent of the clouds can be found away from the Galactic plane at high Galactic latitudes. Many of the objects appear to be a part of large structures, which might indicate a formation mechanism; however, it is difficult to determine whether these structures are real from two-dimensional maps. Recently, accurate distances to many of these high latitude molecular clouds have been determined (Schlafly et. al 2014). We present here a three-dimensional representation of the spatial distribution of these objects in an effort to discern global structure patterns.

Yield Improvement of *Pyrococcus furiosus* Soluble Hydrogenase I by Overexpression of Accessory Proteins

Cynthia Ponir
Dr. Mike Adams, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Due to the recent increase in demand for alternative sources of energy, hydrogen gas has begun to receive a great deal of attention. The focus of this study is Soluble Hydrogenase I (SHI) from *Pyrococcus furiosus*, an anaerobic hyperthermophile. SHI has been used in a highly efficient *in vitro* pathway for hydrogen production requiring a large amount of enzyme for up-scaling. Previous studies have shown that eight accessory proteins are involved in the biosynthesis of SHI. However, the expression levels of these accessory genes were unchanged when SHI was overproduced in *P. furiosus*. The purpose of this study is to determine if overexpressing the genes encoding the three key accessory proteins, FrxA and HypC/D, would lead to increased production of SHI. This objective will be carried out by creating two separate knock-in cassettes containing the FrxA and HypC/D genes, pyrF as the genetic marker and a stronger promoter, Pslp, to over express these genes. The parent strain MW450, with SHI over-expressed, lacks a pyrF marker and is therefore unable to synthesize uracil. After confirming overlapping PCR of these cassettes, transformations will be performed. Maintaining anaerobic conditions, subsequent strains will undergo plate purification, popping out the marker for reuse, and qPCR analyses to determine expression levels of the genes encoding the accessory proteins and SHI between the control and experimental strains. In vitro hydrogen production assay will also be performed to determine SHI activity. These procedures provide the basis for improving the yield of SHI and up-scaling the hydrogen production pathway.

Standardized Public Education Funding Formulas: A Best-Practice Evaluation

Laura Pontari
Dr. Jamie Carson, Political Science, School of Public & International Affairs

The use of standardized public school funding formulas by states across the US has become a widespread practice in modern education. Studies have shown that the cost of education varies per student based on identified factors such as socioeconomic status, disability, district size, and English language skills. Funding formulas are meant to allot state funds based on these factors, thus providing a comprehensive plan for equitable allocation. The factors considered in funding formulas vary state by state, as does the weight assigned

to each factor. The study examines the standardized public education funding formulas used by eight states, selected based on overall education quality and geographic distribution. The selected states are Mississippi, New Jersey, Colorado, Massachusetts, Indiana, Arizona, Michigan, and Texas. After an evaluation of the funding formulas used and education quality provided by each state, this study will provide a policy recommendation for a standardized funding formula best-practice.

Developmental Trends in Infant Temporal Processing Speed

Katelynn Porto, CURO Graduation Distinction
Dr. Janet Frick, Psychology, Franklin College of Arts & Sciences

Critical flicker fusion (CFF) is a measure of temporal processing speed, or the speed at which the visual system can detect changes over time. In adults, CFF has been determined to be a strong indicator of executive functioning, neural efficiency, and central nervous system health, and has been positively associated with dietary intake of the carotenoids lutein (L) and zeaxanthin (Z). Previous studies of infant CFF development have been limited and marked by methodological challenges (e.g., Regal 1981), leaving a gap in our understanding of how temporal processing speed develops early in life. The present longitudinal study sought to characterize the development of CFF thresholds in breastfed babies (from 3 to 6 months of age) using a repeated-measures design. Infant CFF thresholds were measured using a two-alternative forced choice preferential looking task displayed on a custom-built device. Growth curve modeling will be used to analyze all data. We anticipate that infants' CFF trajectories will depend upon their baseline (3 month) CFF threshold and their mother's self-reported intake of green leafy vegetables (rich sources of L and Z). In infants, deficits in basic cognitive functioning, such as temporal processing speed, can negatively impact more complex cognitive processes in a cascading manner with age. Therefore, identifying developmental trends in temporal processing speed, as well as potential moderating factors (e.g., L and Z intake), is the first step in being able to detect deficits in this domain early in life, before higher level developmental processes are negatively impacted.

Approaches to Reducing the Cost of Algal Biomass Production

Grace Power, CURO Summer Fellow
Dr. Manjinder Singh, College of Engineering

Alternative fuels must be developed to replace the dangers caused by burning fossil fuels and serve as fuel sources once fossil fuels are depleted. Algae biofuels offer a potential fuel for the future. The most prominent hurdle facing algae biofuels currently is cost. This project aimed to increase the yields of algae grown on a large scale to make algae production more cost efficient. 1-Napthaleneacetic Acid, a plant growth hormone, was used to enhance algal growth in 200L carboys. Two preliminary experiments were conducted to optimize growth medium and phytohormone concentration. The optimum media was determined to be 1-NAA concentration to be 5 ppm (parts per million) and the optimum medium to be F2 media. Algae was grown in a scale-up method to reach a total volume of 200 Liters. Two strains were grown, one inoculated with 1-NAA dissolved into a 1:1 ethanol/water solution and one inoculated with the same concentration of a 1:1 ethanol/water solution for control. Algae was grown in a 250mL flask until optimal density was reached, then was transferred to the next volume stage. This process was repeated until the algae was growing in a 200L carboy. Dry weight, chlorophyll, and optical density measurements were taken regularly between Day 0 and Day

16 in the 200L carboys. Control and treatment test groups showed similar growth rates. Nutritionally optimal harvest was obtained after 9 days of growth. 1-NAA-treated algae produced consistently higher biomass throughout the experiment.

Evaluation of Recovery of Skeletal Muscle after Fatiguing Contractions

Payton Prins
Dr. Kevin McCully, Kinesiology, College of Education

Skeletal muscle fatigue has been an extensively studied topic in order to understand the underlying physiological mechanisms of this occurrence. Our laboratory has developed an electrical twitch stimulation fatigue test for clinical populations. Past literature in the field has pointed to a significant difference in muscle function between populations with neuromuscular disease and deficiencies compared to healthy populations. The aim of my study is to determine the initial rate of recovery of muscle contractions after fatigue has occurred, and to evaluate whether the rate of recovery could be a useful measurement in patients with various neuromuscular diseases or injuries. Measurements were taken in the trapezius muscles of healthy human volunteers. Muscle contractions were induced with sub-maximal twitch stimulations at 6 Hz. Muscle force was estimated using an accelerometer to measure the speed of the twitch contractions. Five minutes of 6 Hz contractions resulted in fatigue of 70% (n=7). In the first three minutes of recovery, muscle force recovered to 30% of the initial force. The ½ time of this early phase of recovery was 15 seconds. Because the muscle is depotentiating as well as recovering during the early phase of recovery, we are in the process of characterizing the time course of depotentiation in order to separate out this effect from recovery. This study has the potential to characterize the rate of recovery after fatigue, a little studied but potentially useful muscle parameter.

The Role of Mitochondrial Maintenance in Skeletal Muscle Strength and Repair

Anita Qualls, CURO Research Assistant
Dr. Jarrod Call, Kinesiology, College of Education

Fukutin knockout mice serve as a mouse model of human muscular dystrophy, i.e., dystroglycanopathies, which are characterized by skeletal muscle weakness and impaired muscle regeneration after injury. Poor mitochondrial quality may underlie these phenotypes, as skeletal muscle mitochondria are responsible for producing the energy required to meet the demands of muscle contraction and muscle repair. Mitochondrial quality is maintained by the proper removal of dysfunctional mitochondria via a cellular process called autophagy. The primary objective of this study is to determine the extent to which enhancing or attenuating autophagy affects muscle strength and repair in the Fukutin knockout mice. We hypothesize that increasing autophagy will lead to greater muscle strength and greater recovery from myotoxic muscle injury. AICAR (an autophagy activator) or 3-MA (an autophagy inhibitor) will be administered to Fukutin knockouts and littermate controls daily for four weeks. To determine if autophagy activation improves dystrophic muscle function, muscle strength will be assessed after two weeks of treatment. To determine if autophagy activation enhances dystrophic muscle regeneration, muscle strength recovery will be assessed two weeks following a myotoxic injury. To determine if autophagy activation affects mitochondrial function in dystrophic muscle, mitochondrial respiration will be assessed from injured and uninjured permeabilized fibers using a Clark-type oxygen electrode. Immunoblots for autophagy-related proteins will be used to examine the autophagy signaling cascade

during muscle regeneration after injury. Overall, by utilizing a mouse model we can gain insight into the importance of mitochondrial maintenance in improving muscle function in muscular dystrophy patients.

Mental and Sexual Health Post-War: Trauma, Depression, and Interpersonal Violence— Attitudes among Liberian Women

Mehabuba Rahman, CURO Research Assistant
Dr. Tamora Callands, Health Promotion & Behavior, College of Public Health

From 1989 to 2003, Liberia experienced two of the most violent civil wars in African history. Fourteen years of war shattered the West African country's infrastructure and community resulting in one-third of population being displaced and 7% of the population being killed. Although millions of people were affected by the war-related violence, violence against women reached unprecedented levels. It is estimated that up to 70% of young women in Liberia experienced some form of sexual and gender-based violence (SBGV). SGBV has wide-spread implications for the mental health, sexual health, and the overall psychosocial well-being of young women. While significant strides have been made to reduce rates of SGBV, little empirical research has focused on consequences associated with violence exposure. Using cross-sectional data collected between November 2015 - February 2016 from 100 young women, ages 18-25, we aim to examine the relationships between violence exposure, war-related trauma, mental health and sexual risk behavior. We hypothesize that violence exposure will be associated with greater sexual and mental health outcomes. Preliminary analysis demonstrates that risky sexual behavior, such as multiple partners and lack of condom usage, is associated with violence exposure. These data underscore the impact that SGBV has on the mental and sexual health of young women. These findings suggest the need for continued efforts to change the policies and implement and infrastructure to protect young women in post-conflict settings.

Examining *Mycobacterium tuberculosis* Genes for Roles in B12 Synthesis

Ashitha Rajeurs
Dr. Russell Karls, Infectious Diseases, College of Veterinary Medicine

Mycobacterium tuberculosis (*M.tb*) is a leading cause of morbidity and mortality in humans. In 2013, *M.tb* caused 9 million new cases of tuberculosis (TB) and 1.5 million deaths. Understanding the physiology and biosynthetic capabilities of *M.tb* bacteria may aid in the development of new drugs and vaccines to fight this global health threat. Coenzyme B12 (Co-B12) functions as a cofactor in various metabolic enzymes in a wide range of organisms, but is only made by bacteria and archaea. Co-B12 is a complex molecule requiring over 20 enzymes for its synthesis. The *M.tb* genome encodes homologs of many Co-B12 synthesis genes; however, the coenzyme is not detected in strains grown under standard culture conditions. Either all of these strains have mutations in the Co-B12 synthesis pathway or production of this molecule only occurs under specific environmental conditions, such as those found inside a human host. *Mycobacterium smegmatis* is a non-pathogenic species of mycobacteria found in soil that produces Co-B12. The goal of this project is to determine if *M.tb Rv2228* and *cobS* function in Co-B12 synthesis. The approach is to first delete *MSMEG4305* and *cobS* from the *M. smegmatis* genome and demonstrate absence of Co-B12 production in the mutants. Next, a wild type copy of the deleted gene or the homologous *M.tb* gene (*Rv2228* and *cobS* respectively) will be introduced into the mutants and the resulting strains assayed for

production of Co-B12. If a *M.tb* gene enables a *M. smegmatis* mutant to produce Co-B12, then the genes likely encode functional homologs. The progress and results of this project will be presented.

Eliminating Cultural and Linguistic Boundaries in Healthcare: Creating Standards and Funding for Medical Interpreters

Vineet Raman, Ramsey Scholar
Dr. Richard Schuster, Health Policy & Management, College of Public Health

The U.S. has increasingly become more culturally and linguistically diverse with the influx of migrants from around the world. The number of Americans speaking a language besides English at home has increased by almost fifty percent, thereby also increasing the number of patients with limited English proficiency (LEP) by over fifty percent. However, weak federal regulation has allowed states to leave the use of appropriate language services at the discretion of individual hospitals, creating a gap in care between English-speakers and patients with limited English proficiency and a surge in the use of untrained *ad hoc* interpreters. The miscommunication that results from the underutilization of professional language services has inescapable consequences for health outcomes in LEP patients. New federal funding for interpreters is available via the Affordable Care Act, and states should be required to use these funds to implement a standard of interpreter of their choice in their hospitals.

A Review of the Use of Telemedicine in Nursing Homes

Sona Rao
Dr. Elena Karahanna, Management Information Systems, Terry College of Business

Telemedicine, the exchange of medical information through long-distance electronic communication, is a practice that nursing homes adopt to improve the effectiveness of their care and reduce health and financial risks. The purpose of this literature review is to evaluate research on the implementation of telemedicine systems in a nursing home setting. Review of this literature was conducted using CINAHL, EBSCO Electronic Journals, Academic Search Complete, ERIC, and PubMed databases and search terms included telemedicine, telehealth, nursing home and homes, elderly, and geriatric. This literature review is based on twenty-six studies related to telemedicine in nursing homes and the following themes were evaluated: benefits, challenges, and limitations in terms of cost and quality of care. Telemedicine is an innovative approach to making medical services more accessible to nursing home residents and nursing homes can experience significant benefits as a result of adopting telemedicine systems.

Behavioral Economic Analysis of Relative Reinforcing Value as a Predictor of Smoking Cessation Treatment Outcomes

Marie Rapoport, CURO Summer Fellow, CURO Research Assistant
Dr. Lawrence Sweet, Psychology, Franklin College of Arts & Sciences

Behavioral economic studies investigating demand for a substance represent an attempt to quantify the amount an individual values a substance relative to other reinforcers using a behavioral paradigm. This approach has been successfully used to characterize the progression of substance use and risk for future substance abuse. The cigarette purchase task (CPT) is designed to assess demand for nicotine in smokers by quantifying the value of cigarettes in monetary units. In the present study, we investigated the relationship between demand and smoking cessation treatment outcome in smokers after

nine weeks of nicotine replacement therapy and cognitive behavioral therapy. In this version of the CPT, participants were asked to report how many cigarettes they would hypothetically purchase across 23 price points, ranging from $0-$10 per cigarette. Principal components analysis was completed using responses on the cigarette purchase task to divide demand into two components based on previous research: amplitude (demand at low costs) and persistence (sensitivity to increasing price). The results showed that, controlling for income, amplitude was significantly predictive of days to relapse, days to lapse, and number of therapy sessions attended**.** The results suggest an individual's valuation of cigarettes independent of competing reinforcers is predictive of smoking cessation treatment outcome while sensitivity to increasing price does not appear to be predictive of treatment outcomes.

A Bright and Budding Future for Sunflowers: Understanding the Predictive Properties of *Helianthus annuus* Seedlings for Improving Adult-Stage Crop Yield

David Reagan, CURO Research Assistant
Dr. Lisa Donovan, Plant Biology, Franklin College of Arts & Sciences

Sunflowers are a multibillion-dollar industry in the United States, are a crucial oil-seed crop, and offer extraordinary agricultural, environmental, and economic potential. Fertilizers are a major expense for farmers, as well as an environmental hazard if excessively applied to croplands. Finding Sunflower varieties that exhibit the relatively best growth under nutrient stress would increase yield, and subsequently reduce expenses for the agricultural and consumer sectors alike. Of even greater interest, better understanding the nutrient application versus yield relationship between the seedling and adult stages of Sunflowers allows for greater efforts on those seedling varieties that offer the greatest probability of success later in the growth cycle. Our greenhouse study examined 12 genetically dissimilar Sunflowers at the seedling and adult growth stages under variable nutrient applications, to better understand which Sunflower varieties demonstrated the best nutrient-stress resistance, and to determine if seedling performance is predictive of adult yield. Results from the seedling stage show that four genetic lines are excellent candidates for producing high yield under diverse fertilizer treatments, especially in low treatments. Results from the adult stage are ongoing, but we expect that many of the Sunflower lines that exhibited relatively high yield in the seedling stage will also exhibit relatively high yield in the adult stage. The results of this study will provide incredible information into correlations between yield and fertilizer application from the seedling to adult stage, benefiting farmers, consumers, and the environment alike.

Lutein and Zeaxanthin Are Unrelated to Performance on the Short Physical Performance Battery

Joshua Reynolds, CURO Research Assistant
Dr. Lloyd Stephen Miller, Psychology, Franklin College of Arts & Sciences

The carotenoids lutein (L) and zeaxanthin (Z) have been shown to benefit eye health and more recently cognitive function. The present study investigated whether L and Z may also benefit physical ability. In light of their strong antioxidant properties and prior research showing a positive relation between antioxidants and physical functioning, it was hypothesized that greater L and Z levels would be associated with better physical performance in late life. Pearson product-moment correlations were used to evaluate this relationship in a sample of 62 community-dwelling older adults (mean age=73.31, 57% female, 100% Caucasian). Physical performance was assessed using the

Short Physical Performance Battery (SPPB), while L and Z levels were measured using two standard, validated procedures: blood serum concentrations and macular pigment optical density (MPOD). Contrary to expectation, no significant relationship was found between SPPB total scores and L and Z, as measured in serum ($r=0.098$, $p>0.05$) or MPOD ($r=0.022$, $p>0.05$). Furthermore, no significant correlations were found between L and Z levels and SPPB subscale scores, which include measures of balance, gait, and lower extremity strength (ps all >.05). The observed findings suggest that the beneficial effects of L and Z may be limited to eye and cognitive health, perhaps due to their preferential accumulation in human retina and brain relative to other body tissues. However, it is possible that a more sensitive measure of physical functioning would reveal a relationship and replication is warranted in a sample characterized by greater variability in physical ability.

Subtracting the Effects of Carbonization of Hickory Nut to Predict Mean Annual Precipitation in Archaeological Sites

Sidney Reynolds
Dr. Laurie Reitsema, Anthropology, Franklin College of Arts & Sciences

Carbonized hickory nut from archaeological contexts could be indicative of mean annual precipitation in the past. By burning modern hickory nut samples from St. Catherine's Island, Georgia at different temperatures and using a mass spectrometer to produce δ13C values, we hope to subtract the effects of carbonization to estimate 13C values before the hickory nut was burned. Then, we will compare those δ13C values to the mean annual precipitation of the years for which we have modern nut samples to create a predictive graph that will be used to establish the relationship between archaeological carbonized nut samples and mean annual precipitation. Knowing the mean annual precipitation for archaeological contexts will greatly contribute to our understanding of paleoclimate and the conditions under which different populations, specifically the Guale Indian population on St. Catherine's Island, sustained themselves.

Synthesis and Surface Engineering of Fe5C2 Nanoparticles for Superior r2 Relaxivity in Liver-Specific MR Imaging

David Rink
Dr. Jin Xie, Chemistry, Franklin College of Arts & Sciences

Liver-specific magnetic resonance imaging (MRI) has been used extensively in detection of malignant liver masses, metastasis indication, as well as observing liver storage disorders. In order to enhance the imaging quality, T2 contrast agents, which induce hypo-intensities on MRI maps, are often administered before imaging. Magnetic nanoparticles, more importantly Fe3O4/Fe2O3-based nanoparticles, have emerged as one of the standards in T2 contrast agents due to their low toxicity, biodegradability, and facile synthetic conditions. However, the iron-based nanoparticles only have a moderate magnetic moment. In this research, iron carbide nanoparticles, here Fe5C2 based carbides, have been successfully synthesized by high temperature thermal decomposition. Fe5C2 nanoparticles possess a superior magnetic moment and do not have oxidation-induced magnetization drops. Samples of 5, 14, and 22 nm carbides were prepared for study. Their surfaces were modified via ligand addition with phospholipids, ligand exchange with zwitterion-dopamine-sulfonate (ZDS), and protein adsorption with casein. These engineered Fe5C2 nanoparticles all exhibit excellent aqueous stability, low toxicity, and high r2 relaxivity. In particular, the casein surface coating resulted in an r2 enhancement of more than two fold, measuring 973 mM-1s-1 for the 22 nm nanoparticles, which is

among the highest of all T2 contrast agents reported to date. Small animal studies further confirmed the improvement of the Fe5C2 nanoparticles over the iron oxides in inducing hypo-intensities on MRI maps and causing little toxicity to the host. This research expands upon our ability to modify contrast character of magnetic nanoparticles and helps to create a new class of MRI contrast agents.

Offensive Realism in a World of Hegemons

William Robinson, CURO Research Assistant
Dr. Andrew Owsiak, International Affairs, School of Public & International Affairs

Offensive realism describes a world in which states try to maximize their relative power at the expense of every other state. Under this grand theory, the goal of each state is to become a (regional) hegemon (i.e., the most powerful state in the geographic area).The foundation for this aggressive behavior is the international system. Because no overarching entity sits above states to protect them from one another, every state develops offensive capabilities, remains suspicious of each other's intentions, and acts rationally to ensure its survival by working toward hegemony. If one accepts this theory and its premises, the behavior of many revisionist states becomes understandable; they want hegemony to ensure security. However, once a state reaches hegemony, as the United States has, the theory is lacking. I challenge the assumptions made by offensive realist theory about the rational behavior a hegemon should enact and consider the implications of a world with several regional hegemons.

Quantification of Contaminants of Emerging Concern in Fish and Shark Tissue from Sapelo Island, Georgia

Jackson Rodgers, CURO Research Assistant
Dr. Marsha Black, Environmental Health Science, College of Public Health

Contaminants of emerging concern (CECs) range from pharmaceuticals to industrial pollutants. There is little research on how CECs affect marine environments and the organisms living in marine habitats. Quantifying these pollutants in marine organisms may indicate inputs from sewage/septic systems from local populations. Research also indicates that CECs pose a potential risk to marine organisms through chronic exposures that could adversely affect their health and that dietary transfer of CECs to higher level organisms is possible. My CURO project investigated if CECs are present in fish tissue and shark plasma from estuaries at Sapelo Island, Georgia. Whole fish tissue samples from silver perch, striped mullet and sea trout were collected from 2013-2016 as part of a NOAA and Georgia Aquarium research project at Sapelo Island. Shark plasma was collected from Lemon and Atlantic Sharpnose sharks during the summer of 2015. These samples were analyzed for 30 pharmaceuticals and personal care products via LC-MS/MS analysis and over 200 pesticides via GC-MS analysis. Initial results indicate that CECs accumulate at low ng/g (parts-per-billion) concentrations in fish tissue and low ng/ml concentrations in shark plasma samples. My research supports evidence our lab has of CECs detected in oysters, water and sediment samples. The detection of diphenhydramine, DEET and sertraline in all media indicates accumulation in multiple levels of the food web. Chronic toxicity may be caused by a cocktail effect of CEC exposure on the organism with multiple modes of action in play, but how these chemicals interact is mostly unknown.

Who Is Better at Cracking Nuts: Humans or Monkeys?

Lindsey Roles
Dr. Dorothy Fragaszy, Psychology, Franklin College of Arts & Sciences

Dating back at least 2.5-3.3 million years, tool-assisted percussion still remains a key technology for hominins. Tool-assisted percussion is not unique to hominins; wild populations of bearded capuchin monkeys, long-tailed macaques, and chimpanzees use anvil-and-hammer tools to crack open nuts and other encased food. To address fundamental questions about the evolution of tool-assisted percussion in hominins, we need to know about species-specific cognitive and motor skills. We quantified nut-cracking skill in wild bearded capuchin monkeys (*Sapajus libidinosus*) and novice and expert humans, as they used anvil-and-hammer tools to crack tucum (*Astrocaryum spp.*) nuts. The monkeys outperformed the novice humans, and the expert humans outperformed the monkeys. The monkeys cracked the nuts by undergoing multiple strikes with a moderate amount of force; the novice humans used the same amount of force the monkeys did, having to undergo multiple strikes in order to crack the nuts. The expert humans used a greater amount of force to crack the nuts and a fewer number of hits than the monkeys and novice humans. The monkeys also modulated the force of their strikes on the basis of the condition of the nut (i.e. presence of fracture in nut). These results indicate that the nut cracking skill involves motor actions that are learned over time with practice, and not just abstract knowledge of the affordances of the task, i.e., nut cracking is an embodied skill. We suggest that hypotheses linking tool-assisted percussion to traits unique to hominins need a reassessment.

Muscle Adiposity, Forearm Muscle Strength, and Radius Cortical Bone Geometry in Children

Emily Rollins, CURO Research Assistant
Dr. Richard Lewis, Foods & Nutrition, College of Family & Consumer Sciences

Background: Cortical bone strength is highly dependent upon skeletal muscle, specifically muscular contractile forces. Adipose tissue that infiltrates the muscle may influence muscle strength, and subsequently the muscle-cortical bone relationships. *Objective:* The aim of this study was to determine the effect of muscle adiposity on the relationships between forearm muscle strength and mid-radius cortical bone outcomes. *Methods:* This cross-sectional study utilized data from a cohort of 237 reportedly healthy black and white boys and girls who participated in a vitamin D supplementation trial. A hand dynamometer was used to measure forearm muscle strength. Mid-forearm muscle adiposity and radius cortical bone geometry were measured via peripheral quantitative computed tomography. Polar strength strain index (pSSI) provided an estimated measure of bone bending strength. A median cutoff determined groups of high and low muscle adiposity. Linear regression and hierarchical linear regression were performed adjusting for race, sex, and sexual maturation rating stage. *Results:* Handgrip strength was greater in the children with low versus high muscle adiposity ($P = .001$). Handgrip strength was a positive predictor of pSSI in both the low ($\beta = 0.252$, $P = .002$) and high ($\beta = 0.377$, $P < .001$) muscle adiposity groups. However, this relationship was significantly stronger in the high muscle adiposity group (Pinteraction = .014). *Conclusions:* Obese vs. normal weight children have a greater risk for fractures, though the etiology is unclear. Our data do not support the position that muscle adiposity hinders the muscle strength-cortical bone relationship despite corresponding deficits in forearm muscle strength.

Malaria in the Late Stages of Pregnancy and the Significance of Tissue Factor

Kerryn Roome
Dr. Julie Moore, Infectious Diseases, College of Veterinary Medicine

Despite immunity in malaria-endemic regions, pregnant women have an increased

susceptibility to an infection. In these women, malaria infected red blood cells can accumulate in the maternal side of the placenta, causing drastic changes in the placental tissue, hampering fetal intrauterine growth, which leads to low birth weight, stillbirth, and abortion. Due to ethical and anatomical limitations in studying this in humans, murine models are a common alternative. We have previously shown that Tissue Factor (TF), the initiator of coagulation, is associated with abortion in C57BL/6 mice infected with *Plasmodium chabaudi*. While we know TF is upregulated in response to TNF, the relationship between TF and TNF signaling has not been investigated. TNF is a pro-inflammatory cytokine that has been associated with malaria pathogenesis in mice and in humans. TNF acts through its surface receptors, TNFR1 and TNFR2. We hypothesize that TNF signaling through its surface receptors is required for upregulation of TF and induction of the coagulation cascade followed by tissue damage and abortion. To verify this hypothesis, we will use mice lacking TNF, TNFR1, TNFR2, and wild-type C57BL/6 mice infected on day 0, 6, 8 or 10 of gestation and uninfected controls. The courses of infection and pregnancy will be monitored and mice will be sacrificed to have organs and plasmas collected for TF expression assessment on gestation days 10 and 18. We expect that wild-type C57BL/6 mice will have significantly higher expression of TF while mice lacking TNF and its receptors will have lower TF expression.

Predictable Variation in Temporal Transmission Potential: West Nile Virus as a Case Study

John Roquet, CURO Summer Fellow
Dr. Andrew Park, Odum School of Ecology

Generalist parasites such as West Nile virus (WNV) are characterized by their ability to infect, and transmit among, multiple host species. In the case of WNV, passerine song birds are particularly important in maintaining transmission, while other bird orders dilute the transmission potential because of relatively low viral replication in those hosts. Due to the predictable migrations of bird species, as well as the emergence and overwintering times of mosquitoes that vector the virus, we expect a given location to exhibit robust annual seasons when transmission is intense. As WNV spills over into human populations, we have the potential to develop risk profiles which vary in time according to the mosquito and bird population dynamics. To achieve this, we developed a set of equations describing the dynamics of WNV transmission in the mosquito-bird community system, and derived a metric of transmission potential. We parameterized the model using data on mosquito and bird dynamics in New York, confirming transmission intensity had pronounced, repeatable seasonal variation. We then tested the hypothesis that human cases of WNV in New York correspond to periods of high transmission intensity in the bird-mosquito cycle (with some delay expected in the human cases for various reasons). Using records of WNV in New York from 2000 to 2013, we found a significant correlation between our predicted timing of maximum transmission and peak cases in human populations, with a consistent 5-week delay. This novel approach to modeling disease outbreak potential may improve predictions of epidemics more generally.

Evaluation of Georgia Bridges and Development of Large-Scale Bridge Testing Procedure

Nicholas Rorabaugh, CURO Research Assistant
Dr. Mi Geum Chorzepa, College of Engineering

The primary goals of this research are to (1) evaluate existing bridge drawings to determine critical bridge parameters necessary for severe

storm evaluations and; (2) develop a test procedure for evaluating large-scale bridge components. How would these bridges hold up in severe weather, specifically hurricane weather, and how can traffic be simulated through single component force testing? The first part of this research includes a review of 50-60 bridge drawings and evaluation of critical bridge components for a Georgia Department of Transportation project. This includes gathering information from the drawings about the design, elevations, spans, slab, beams, girders etc. The other part of the research includes construction of a large-scale bridge beam specimen and development of test procedures for simulating ordinary highway traffic. The test procedure can be used for future research projects. For example, testing closure pours between precast elements utilizing Ultra-High Performance Concrete (UHPC) is of particular interest. The UHPC allows for tighter joints between precast elements and facilitates rapid construction. This semester's research will focus on identifying critical bridge parameters and testing a beam specimen for traffic or long-term fatigue loading. The beam testing will be done in UGA's STRENGTH lab by using a high tech camera and sensors to measure inflections not visible to the eye.

Analysis of Forces Acting on the Equine Navicular Bone in Normal and Dorsiflexed Positions

Kaitlyn Ruff, CURO Research Assistant
Dr. Elizabeth Uhl, Pathology, College of Veterinary Medicine

Navicular disease is one of the most common forms of lameness in horses and is generally thought to be a chronic condition that can be managed in some horses but not effectively treated. However, a pathomechanical paradigm may offer a better explanation of the disease and provide better treatment options. The navicular apparatus is a functional enthesis organ that is highly adapted to dissipate forces away from the osteotendinous junction between the deep digital flexor tendon and the third phalanx. Based upon functional analyses of horses with navicular disease, we have hypothesized that chronic overloading of the forelimbs, which induces the habitual and exaggerated dorsiflexion of the foot, changes the balance of forces acting on the navicular apparatus. We tested our hypothesis by comparing the forces acting on the navicular apparatus of an equine foot in a normal position to those acting on the navicular apparatus in a dorsiflexed foot, using the method of free-body analysis on 3D models, which were reconstructed from data of x-ray CT scans of a horse forelimb. Results indicate that the dorsiflexed position of the foot puts the deep digital flexor tendon under greater tension, thereby creating a larger compressive force on the navicular bone. This site of compression corresponds to the characteristic "bone bruise" of navicular disease. The dorsiflexed position of the foot also pulls taut the impar and suspensory ligaments, thereby increasing tension on their attachments sites on the navicular bone. This increased tension explains the presence of osteophytes along the entheses of these ligaments, which is a common lesion in navicular disease. Thus, decreasing the habitual and exaggerated dorsiflexion of the foot by taking the extra weight off of the forelimb is likely to be an effective treatment for many cases of navicular disease.

Investigating the Influence of Geospatial Attributes on Spider Species Richness and Diversity

Katherine Russell
Dr. Jason Schmidt, Entomology, College of Agricultural & Environmental Sciences

The maintenance of local biodiversity is an important aspect of the long-term sustainability of agricultural production.

Maintaining biodiversity, especially in regards to predator species, promotes natural pest control and many other ecosystem services. Spiders (*Araneae*) often prey upon common pest species, making them a beneficial component of agroecosystems. Spider species richness and diversity varies across landscapes and is often correlated with certain abiotic factors. This project investigates how four geospatial attributes – elevation, soil moisture, NDVI, and distance to edge habitat – influence spider species distributions across a farm-scape in South Georgia. Samples for the project were obtained from pitfall traps placed along a grid pattern within a farm-scape in the Tift county area. Spiders were later removed, preserved in alcohol, and manually counted and identified. Counts and species data were compiled into a spreadsheet and correlated with the four selected attributes using multivariate methods and geospatial statistics. Final results are pending. Preliminary analysis shows at least 12 different species of spiders present across the farm-scape, with wolf spiders (*Lycosidae*) numerically dominating the communities. Further identification of spiders and more in-depth analysis of the data will allow for greater exploration of the relationship between spider abundance, diversity, and the farm-scape's geospatial attributes. Ultimately, the results should help growers identify potential spider hotspots within their farm-scapes, which could then be maintained to promote healthy populations of this beneficial predator.

How the Recruitment of Female Fighters for Islam Has Changed Transnational Terrorist Organizations and What the Long-Term Implications of This Trend Will Be for Interstate Conflicts

Sarah Sammons
Dr. Andrew Owsiak, International Affairs, School of Public & International Affairs

The purpose of this research is to answer the question of: what has made the messages of terrorist organizations so appealing to women, despite the fact that they come from an element of the Muslim spectrum that has sought to suppress and silence female participation in public life? The initial roots of the feminization of armed conflicts can be traced back to the revolutionary movements of the region of the Middle East during the mid to late 20th and early 21st centuries, with women serving as couriers, nurses, combatants, and intelligence officers. Since 9/11 there has been an empirical shift towards female involvement in terrorist activities, especially in participation in suicide bombings. My goal is to conceptualize these types of female violence in terms of a larger paradigm shift; I will accomplish this by examining quantitative data from feminist groups participating in civil societies across the Middle East and completing a literature review to produce new qualitative research. A new vision is needed in international relations to addressing issues such as female participation in terrorist organizations through a "gendered lens," where agency and the very identity of who a terrorist can be is adjusted at a theoretical level. On a very basic level, addressing terrorism means studying more than states and organizations. Terrorism is executed by people, increasing numbers of whom are women, and developing ways to see the societal framework that propels them toward destruction is crucial in approaching ways to combat the ever-evolving transnational terrorist organizations.

Evaluation of Novel Antiviral Drug NS95397 for Treatment of Swine Influenza Infections in Pig Cells

Preston Samowitz, CURO Graduation Distinction
Dr. Ralph Tripp, Infectious Diseases, College of Veterinary Medicine

The influenza virus causes morbidity and mortality in both humans and animals. Swine influenza effects pigs worldwide and can be

transmitted to humans. Additionally, the influenza virus possesses a major threat in the swine industry that may affect production output. Discovering countermeasures for the influenza virus has faced many obstacles because the virus constantly evolves, a feature often causing vaccines and antiviral drugs to be ineffective. In this study, swine influenza was assessed to discover if a novel antiviral drug could be used as a treatment option. A novel drug, NSC95397, targets host cell mechanisms captured by the influenza virus that are needed for replication. Importantly, NSC95397 has been shown to alleviate influenza symptoms in mice. A host cell factor, cell division cycle 25 B is the target for NSC95397 that indirectly inhibits a key viral protein NS1, involved in the replication of the virus. The goal was to characterize the escape mutant virus after serially passaging the virus in the presence of NSC95397. Drug sensitivity assays on various passages demonstrated that the strain does not appear to have resistance to this novel drug. This finding has implications on understanding how targeting host genes limits virus resistance and development of a novel influenza antiviral therapeutic.

Cognitive Control as Assessed by Multiple Eye Tracking Paradigms

Kodiak Sauer
Dr. Jennifer McDowell, Psychology, Franklin College of Arts & Sciences

Ocular motor tasks are an effective way to assess cognitive control easily and accurately. One such task, the antisaccade task (AS), is used to measure inhibition in diverse populations, but requires more cognitive operations than inhibition alone to volitionally move the eyes to the mirror image location of a stimulus. Therefore, it is unknown if poor performance on the AS is due to difficulties in inhibition, working memory, or other factors. In order to differentiate components of cognitive control in ocular motor tasks, college-aged participants (n=51) completed an ocular motor battery. In addition to the AS task, participants completed an ocular motor delayed response task (ODR), which tests both working memory and inhibition, and a minimally delayed ocular motor response task (MDOR), which tests inhibition in isolation. Preliminary results (n=10) show a relationship between MDOR error rate and both ODR and AS error rate. This suggests that these tasks assess a similar construct, presumably inhibition. We also found similar reaction times in the ODR and AS tasks, which suggests that generating a volitional saccade to a blank location in both tasks requires similar processing time, despite differences in task demands. The findings from this study will clarify how various cognitive control processes interact in each of these ocular motor tasks and will inform the design of an efficient set of tasks to study people with cognitive control impairment.

The Relationship between Central Nervous System Xanthophyll Status and Brain Activation in Healthy Older Adults

Kodiak Sauer, Jacob Beckham
Dr. Lisa Renzi, Psychology, Franklin College of Arts & Sciences

Xanthophyll carotenoids lutein (L) and zeaxanthin (Z) are the only carotenoids found in the neural retina and are the dominant carotenoids in the rest of the central nervous system. An emerging body of literature suggests that high levels of these carotenoids in the neural retina are predictive of improved cognitive function in adults across the lifespan. Renzi and Hammond (2010) proposed a hypothesis for how lutein and zeaxanthin might influence cognition, known as the neural efficiency hypothesis. This hypothesis suggests that individuals with higher levels of the xanthophylls are capable of processing information rapidly and with less noise than individuals with low levels. In order to test this hypothesis, a total of 51

older adults (*M* = 73 +/- 8.2 years) were supplemented with either 12 mg L+Z or placebo. Retinal L+Z levels were measured psychophysically using heterochromatic flicker photometry. At baseline, participants in the highest and lowest quintiles for retinal L+Z levels were selected for analysis. High density electroencephalography was performed to measure brain activation at rest, as well as to measure steady-state visual evoked potentials at three driving frequencies. Participants with high retinal L+Z levels showed increased brain activation at each driving frequency, suggesting improved neural efficiency. These individuals also showed increased brain activation at rest.

Off-Campus Housing and the Gentrification of Downtown Athens, GA

Kari Saunders, CURO Research Assistant
Dr. Juan Meng, Grady College of Journalism & Mass Communication

Purpose: The purpose of this research is to study the effects of different types of student housing accommodations on the city of Athens, specifically in the downtown area. There has been an influx of large, luxury-style apartment complexes built within the last five years, and the impact of these complexes could prove meaningful to students, non-student Athens residents and city officials. *Design/methodology/approach*: The researcher used two research methods in this study to investigate the subject: (1) an online survey of UGA undergraduate students currently living in the Athens area; (2) two focus groups—one with five participants and the other with four participants—with UGA undergraduate students currently living in the Athens area. *Findings*: Results suggest that the downtown Athens area is certainly being affected by the large, luxury apartment complexes being built nearby and that students are drawn to these complexes most because of the location and proximity to campus. *Practical implications*: The influx of luxury apartment complexes has impacted the displacement of low-income Athens residents and aided in the wave of large chain retailers such as J. Crew and Urban Outfitters buying retail space in downtown Athens. The diversity in these complexes is low, and the individuality of the downtown Athens area is being reduced because of the shift in businesses located there. *Originality/value*: The study focuses on an issue that is inherently related to the University of Georgia. While the research did show some insights from Athens specifically, the specificity of this research is certainly unique. It is important that the change of the Athens area because of student impact is measured and explored.

The Effect of Maternal Diet on Gastrointestinal Health of Offspring

Ruth Schade, CURO Research Assistant
Dr. Claire de La Serre, Foods & Nutrition, College of Family & Consumer Sciences

The gut communicates to the brain the quality and quantity of nutrients in the gastrointestinal tract as a way of regulating food intake, and this regulation mechanism can be influenced by environmental factors like maternal diet. Bacteria are a source of inflammation in the gut, so hosts have anti-inflammation mechanisms to control for this. One of these mechanisms, Intestinal Alkaline Phosphatase (IAP), is a duodenal enzyme that detoxifies bacterial LPS products. Chronic high fat diets decrease the activity of IAP, and low IAP activity is associated with a propensity for obesity, so what is the effect of maternal diet on IAP levels in offspring? Female mice were put in three groups with each group consuming diets high in fat, low in fat, or high in fat with added glycan. These lasted from three weeks before mating, through the duration of pregnancy, and throughout a three week lactation period. After the offspring were weaned, they were either fed the same, high or low fat, diet as the mother, or the opposite diet, over the course

of ninety days. At the end of this period, tissue samples were collected and levels of IAP were analyzed. It was found that the offspring of mothers fed a high fat diet had decreased IAP activity, which may increase their risk for obesity.

The Effects of Lifetime Sports Participation and Sedentary Time on Muscle Capacity: Does More Activity Offset the Effects of Prolonged Sitting?

Nathan Schlies
Dr. Michael Schmidt, Kinesiology, College of Education

In concurrence with the infiltration of technology into our daily lives, emerging evidence suggests that sedentary behavior (SED) is rising, and that the population generally fails to adhere to physical activity guidelines. SED and inactivity have independent effects on a range of cardiometabolic outcomes but few studies have explored whether this is the case regarding muscle capacity. Muscle capacity is a predictor of cardiometabolic risk and all-cause mortality, and is positively associated with weight management and functional capacity through its close ties to lean mass and metabolic rate. Thus, greater muscle capacity is advantageous to health. Due to the pervasiveness of SED and inactivity, the aim of this study was to examine the extent to which lifetime sports participation might offset potentially negative effects of SED on muscular capacity. Participants were part of a longitudinally studied cohort [n=99 (n=33 male); 12-19 yo]. Lifetime sports participation was measured using the Bone-specific Physical Activity Questionnaire. SED was measured using the Adolescent Sedentary Activity Questionnaire. Muscle capacity was measured using the Nottingham Leg Extensor Power Rig (Power) and the Biodex isokinetic dynamometer (Strength), combining the greatest trial in each, with lean mass of the corresponding region from Dual Energy X-ray Absorptiometry to create normalized ratios. It is expected that frequent sports participation during youth will be positively associated with muscle capacity, and greater SED will be inversely associated with muscle capacity. We anticipate that the negative effects of high SED will be attenuated by greater lifetime sports participation.

The Effects of Migration and Infection on Resting and Flight Metabolism in Monarchs

Hayley Schroeder, CURO Research Assistant
Dr. Sonia Altizer, Odum School of Ecology

Long-distance migration requires physiological changes to prepare for and sustain energetically costly migratory movements. Some migrants, such as the monarch butterfly (*Danaus plexippus*), atrophy reproductive organs and enter reproductive diapause to minimize energetic costs. The ability to migrate, however, can be jeopardized by infection. This study explored the effects of reproductive diapause and infection by a protozoan parasite *Ophryocystis elektroscirrha* on flight metabolism of the monarch butterfly. We expected that migratory monarchs in reproductive diapause would have a lower flight metabolism than reproductively active non-migratory monarchs as a mechanism to conserve energy for the long journey. We also predicted that infected migratory monarchs would show higher flight metabolism than healthy migrants due to the accelerated dehydration and reduced flight performance that are known to result from infection. Wild migratory monarchs and lab-reared monarchs were used in the study. We used a tethered flight mill to induce 10 minutes of continuous flight, immediately after which we measured flight metabolism (quantified as an O2 consumption). Results indicate that migratory monarchs in reproductive diapause demonstrate a lower flight metabolism than reproductively active non-migrants. We also found no difference in

flight metabolism between infected and healthy individuals. Our findings enhance the understanding of the mechanisms underlying monarch migration and the implications of disease on this migratory species.

Comparing Immune Defenses and Pathogen Susceptibility in Closely Related Host Species

Hayley Schroeder, CURO Summer Fellow
Dr. Sonia Altizer, Odum School of Ecology

Closely related species often exhibit similar immune responses against parasites. However, exceptions occur in which closely related species can show different immune responses against shared parasites. Differences in host defenses can be influential for infectious disease dynamics in wildlife. Monarch (*Danaus plexippus*) and queen (*D. gilippus*) butterflies belong to the subfamily Danainae. Previous observations suggest that monarchs and queens could have different immune responses to shared parasites. As one example, both species are known to host a protozoan parasite that specializes on *Danaus* spp. Despite similar levels of exposure, queens are more resistant to the protozoan than monarchs in experiments and show a lower prevalence of infection in the wild. The goal of this study was to investigate if these closely related butterfly species differ in susceptibility and immune responses to a different, generalist pathogen commonly found in insects. We also tested if fitness measurements varied among species after infection. We inoculated both queens and monarchs with the generalist pathogen *Serratia marcescens*. The results indicated that queens were innately better defended, as demonstrated by higher hemocyte concentrations and greater phenoloxidase activity. There was also a trend of lower mortality in queens, but a larger sample size is required to determine if this trend is significant. Because wild monarchs must energetically invest heavily in migration in eastern North America, the possibility for a trade-off exists where monarchs might be less well defended, making them more susceptible than queens to infection by both generalist and specialist pathogens.

Nazi vs. "Soup Nazi": The Double-Talk of Holocaust Rhetoric

Rachel Schwartz, CURO Honors Scholar
Dr. David Williams, Religion, Franklin College of Arts & Sciences

Between 1933 and 1945, Jews in Europe were subjected to harsh dehumanization, which culminated in the systematic murder of more than six million Jews in what is now called the Holocaust. The persecution of European Jewry did not happen overnight. Rather, it was a slow and careful manipulation of the masses that turned humanity against itself. Seventy years later, this event still holds a central role in the world's psyche, influencing the way we use words related to it. The question posed by this project is, "How is Holocaust rhetoric used in the contemporary world?" Analysis of political speeches and popular media suggests that the Holocaust is used as a double-edged sword in the contemporary setting: with seriousness in the political arena, but with frivolity in popular culture. On one hand, the use of Holocaust rhetoric in the contemporary political arena confirms that Holocaust rhetoric remains powerful. Politicians routinely invoke the Holocaust to further their agendas, imbuing a malicious situation or individual ("He is another Hitler!") with such strong meaning that it triggers a collective memory and cannot be ignored. On the other hand, as time progresses we are becoming distanced and desensitized to the Holocaust. This has led, in turn, to flippant use of Holocaust terminology in popular culture. Thus, while once representing the epitome of evil, some terms specifically related to the Holocaust (e.g., Nazi) have become overused and

commonplace in popular culture (e.g., *Seinfeld's* "Soup Nazi").

"Brave Little Belgium": The British Home Front Response to Belgian Refugees, 1914-1918

Leah Scott, CURO Graduation Distinction
Prof. Steven Soper, History, Franklin College of Arts & Sciences

The outbreak of World War I brought with it an unprecedented rate of noncombatant displacement in Europe. Among the first populations displaced by German invasion were Belgian civilians, who fled to France and Great Britain. With a strong history of privately funded humanitarian aid, the influx of approximately 200,000 Belgian refugees was initially received with enthusiasm by British civilians isolated from the battlegrounds of the continent. But as the war stretched over years rather than months, British civilians became agitated by the continued presence of the Belgians. This paper examines the evolution of public perception of Belgian refugees in Great Britain from 1914-1918. Using the British Newspaper Archive and the text analysis program Voyant Tools, this paper tracks the words chosen in association with refugees over the course of the war in the most appropriate form of public discourse—the local newspaper. Personal diaries supplement the newspaper database to glean an accurate picture of the British home front experience with refugees. In the public eye, Belgians transformed from romanticized martyrs victimized by German brutality to burdens, troublemakers, and even criminals. This British disillusionment is due to a number of factors, including Victorian morals, employment concerns, and the failure of Belgians to live up to the highly idealized image promoted upon their arrival. The British response to the Belgian refugee influx reveals both an insight into the early 20th century British national identity and the patterns of emotion experienced by host countries the longer refugees remain.

Development of a Non-Radioactive High Throughput Assay to Detect Thyroid Hormone Uptake in Cryopreserved Hepatocytes in Suspension

Julian Selano
Dr. Jason Zastre, Pharmaceutical & Biomedical Sciences, College of Pharmacy

Transporter proteins (transporters) play a large role in uptake and distribution of many natural and medicinal chemicals within the body. The liver specifically relies on transporters for the uptake and efflux of chemicals, as it is involved in the pharmacokinetic parameters of absorption, distribution, metabolism, and excretion (ADME). A multitude of radiolabeled transporter assays exist for the detection of chemical uptake and drug-drug interactions. However, few non-radioactive assays involving uptake transporters have been developed; and none, to our knowledge, have been developed specifically for the uptake of thyroid hormone. An assay for the detection of thyroid hormone uptake would be advantageous in identifying potential inhibitors. In this study, a high-throughput non-radiolabeled thyroid hormone uptake assay was developed using a procedure similar to the Oil Stop method commonly used with radioactive assays, however this technique employs the use of LC-MS/MS technology and cryopreserved hepatocytes. The 96 well assay exposes cells to thyroid hormone as a substrate and other chemical agents as possible inhibitors, and allows for the rapid assessment of potential inhibition. We hope to be able to employ this technique in future research to identify environmental chemicals as potential inhibitors of thyroid hormone uptake.

Use of Social Recognition Test and Open Field Test to Assess Piglet Cognition

Kathryn Sellman
Dr. Franklin West, Animal & Dairy Science, College of Agricultural & Environmental Sciences

Due to similarities to children in brain formation and development, the piglet is an ideal model to assess cognitive function using behavioral tests. Two important cognitive tests utilized in this study are social recognition and open field tests, which quantitatively assess social memory and piglet behaviors including anxiety and willingness to explore. In the social recognition test, piglets are exposed to an unfamiliar pig and a novel object in a sociability test, followed by a 10 minute inter-phase interval, and then exposed to a familiar pig and a novel pig in a social recognition test. Piglets are expected to spend more time with the unfamiliar pig in the sociability trial than the novel object and are expected to spend more time with the novel pig in the social recognition trial than the familiar pig, indicating that the piglet had retained a social memory of the familiar piglet. In the open field test, piglets are placed in an open arena for 10 minutes to monitor different aspects of behavior such as ambulation, exploratory interest, and anxiety. Piglets are expected to explore fewer zones and become less ambulatory over time, demonstrating significantly decreased exploratory interest as time passes, and generally to become less anxious. This test overall should display that the piglets will become habituated to the arena. Taken together, these two tests will quantify normal piglet behavior, which can be used in the future as a basis of comparison to assess cognitive deficits associated with neural disease and injury models.

Susceptibility to Chronic Social Defeat Stress Increases Ethanol Consumption in Mice

Michelle Sequeira, CURO Research Assistant
Dr. Jesse Schank, Physiology & Pharmacology, College of Veterinary Medicine

Stressful life events are known to cause and worsen both depression and alcohol use disorders. In the human population, these stressful events are often social in nature. Because of the prevalence of these two disorders and their comorbidity, chronic social defeat stress has been used as a preclinical model in mice. The social defeat paradigm involves placing an intruder mouse into the home cage of a resident mouse and allowing the resident mouse to attack the intruder. Mice exposed to chronic social defeat stress display two phenotypes: resilient and susceptible. Susceptible mice display the depressive-like phenotype of decreased social interaction while resilient mice exhibit social interaction behavior that does not differ from controls. The goal of this experiment was to determine the effect of the social defeat paradigm on social avoidance and ethanol consumption. First, the phenotype of each mouse was determined using a social interaction task after defeat. Ethanol consumption was then measured using a two-bottle choice between water and 20% ethanol. The data indicated that susceptible mice display significantly increased avoidance behavior and ethanol consumption than both the control and resilient mice. The resilient mice display avoidance behavior and ethanol consumption that is not significantly different from controls.

Variation of Nanoparticle Surface Lipophilicity for Blood Brain Barrier Penetration

Nivita Sharma, CURO Honors Scholar, CURO Summer Fellow, CURO Research Assistant
Prof. Shanta Dhar, Chemistry, Franklin College of Arts & Sciences

Several medical complications occur in the brain and cause significant damages. One such example is stroke: the third leading cause of death in the United States. Unfortunately, there is only one FDA approved drug for stroke treatment, tissue plasminogen activator. A plethora of drugs for stroke treatment is not available because the brain is protected by a layer of tightly packed endothelial cells, which forms the blood brain barrier (BBB). The BBB restricts movement of substances across the barrier and into the brain. This protects foreign and usually harmful substances from entering the brain and causing unwarranted damage. However, substances that can cross the BBB are small in size and highly lipophilic. A potential for stroke treatment that we are working towards is using aspirin to reduce inflammation in the brain after a stroke occurs. Reducing inflammation is the precursor to using stem cells to regenerate damaged neurons that can revive lost brain function. A highly lipophilic mitochondria targeted nanoparticle is ideal to deliver aspirin across the BBB. Therefore, this project focuses on optimizing the surface lipophilicity of nanoparticles by varying carbon chain lengths of the targeting ligands that are attached to the surface of the polymeric nanoparticles. The targeting ligands are comprised of a triphenylphosphonium cation attached to a carbon chain. Here, we study varying chain lengths from three to eight alkyl groups to evaluate which carbon chain length most effectively increases the surface lipophilicity of the nanoparticle; thus, optimizing the nanoparticle's ability to cross the BBB.

Parasite Infection and Host Behavioral Complexity

Caroline Shearer, Foundation Fellow, CURO Research Assistant
Dr. Vanessa Ezenwa, Odum School of Ecology

This study examines whether parasites affect the behavioral complexity of their hosts. We addressed this question by examining behavioral data collected from Grant's gazelles (*Nanger granti*) that were part of an experimental parasite removal study. Some of these gazelles were treated with an anthelmintic drug to clear gastrointestinal worms. The way that treated gazelles distributed their time among various behaviors was compared to the way that untreated control gazelles distributed their time. Behavioral complexity was measured as the time it took for an individual to switch from one behavior to another. We tested the hypothesis that treated gazelles have more complex behavior than untreated gazelles because they spend more time performing one behavior before switching to another. Preliminary analyses show that treated individuals had longer bouts of feeding before switching, when compared with their untreated counterparts. These findings reveal that parasite infection can influence subtle aspects of behavior in wildlife.

Using an Unconventional Tool: A Capuchin Monkey Becomes Skillful

Spencer Sheheane
Dr. Dorothy Fragaszy, Psychology, Franklin College of Arts & Sciences

Skillful individuals adapt their movements in accordance with the changing constraints of the task, body, and environment. We explored how one tufted capuchin monkey developed skill in using a tool. We used a tool presenting unfamiliar properties to probe the monkey's dexterity. The task was to use a hoe to retrieve a token from a solid, smooth surface. The handle of the tool was rigid, or had one or two joints that permitted the head of the hoe to move at right angles (novel compositions). In Training, the monkey used the tool 100 times in each condition in fixed order (rigid, one joint, two joints). In a Test phase, the monkey was presented with 40 trials of each

condition (120 trials in total) in randomized order. The monkey's behavior with the tool in the first and last 20 trials of each condition in Training and the last 20 trials of each condition in the Test phase were coded using video playback. The number of all actions with the tool declined in each condition between start and end of Training, and again between the end of Training and the Test phase. Terminal performance with the jointed tools averaged 2.92 moves per trial, barely above the minimum possible (2 moves/trial). These results suggest that the monkey mastered using altered tools with a relatively small amount of practice.

The Influence of Nutrient Stress on Mass Performance Rankings among Cultivated Sunflowers

Kiara Shelby
Dr. Lisa Donovan, Plant Biology, Franklin College of Arts & Sciences

As sunflower crops become of higher demand for their many uses as ornamentals, food and as a major oil-seed crop, there is also an increasing need for the development of nutrient efficient sunflower cultivars that can produced relatively high crop yields in varying nutrient conditions. Due to the nutrient availability around the world, the development of these cultivars can lead to a reduction in the economic and environmental impacts associated with fertilization. The purpose of this study is to serve as a pilot study for assessing a small subset of diverse cultivated sunflower lines in the greenhouse for resistance to nutrient stress using biomass as a measure of performance. Mass performance rankings are assigned to lines in each maturity stage, seedling and budding, across several nutrient treatments to determine whether or not line performance rankings change as plants at the seedling stage develop to the budding stage and across nutrient treatments. Rankings for both above ground shoot mass, a trait greatly associated with plant yield, and below ground root mass, a trait greatly associated with nutrient acquisition, were used to identify if line performance at the seedling stage is indicative of their performance at the adult stage for overall plant yield and nutrient stress tolerance. Analysis is currently under way, however, the traits noted in this study and in the later study to be conducted on a larger subset of the cultivated sunflower population can lead to further research towards breeding efforts in developing more nutrient efficient sunflower cultivars.

Personality Predictors of Team Work Relationships: Characteristics that Make Friends

Benjamin Shepard, Julia Willis, Alex Moore, Holly Wright, Nick Sciales
Dr. Dorothy Carter, Psychology, Franklin College of Arts & Sciences

Industrial and Organizational Psychologists have demonstrated repeatedly that individuals' stable personality traits, especially their levels of conscientiousness and emotional stability, predict *individual* job performance. However, in the 21st century, organizations are increasingly relying on flatter, team-based work structures, and individuals are required to *team-up* with other individuals to solve larger problems. Thus, there is a pressing need to better understand the degree to which the previously observed relationships between personality traits and individual job performance translate to team contexts. In our study, we investigate the degree to which the Big Five personality traits of Conscientiousness, Agreeableness, Neuroticism, Openness to Experience, and Extraversion predict the emergence of *teamwork relationships* between participants in a complex interdisciplinary multiteam task. In this task, 12 participants are randomly assigned to a role on one of four 3-member teams and are required to apply their role-specific information during a multiteam decision-making activity. Prior to participating

in the study, participants complete self-report measures of personality. Then, during the experiment, participants complete a series of self-report sociometric perceptual measures of teamwork relationships (e.g., information sharing, trust, collaboration, ease of interaction). This measurement approach identifies the networked patterns of teamwork relationships that have emerged during collaboration. In our analysis, we use a class of inferential models of network emergence and development called *exponential random graph models* that model the antecedents of relationship emergence. This analytic approach allows us to identify the personality traits that are the strongest predictors of effective teamwork interactions.

IO Variables in Gaming: When Work is Play

Benjamin Shepard
Dr. W. Keith Campbell, Psychology, Franklin College of Arts & Sciences

Over the past decade, virtual environments have become more and more prevalent in many people's day-to-day lives. Because of this increase, it has become important for us to better understand their impact on individuals and organizations. In this study, our research group will be examining variables from many different fields of psychology. Some of these variables include variables related to Industrial and Organizational (IO) psychology: personality, leadership, informal leadership, and judgement and decision making in virtual environments. The IO team in this study will be trying to develop an understanding of the individual differences in attitudes and behaviors in different types of virtual environments. We will also examine the impacts of the real world context on the virtual environment so that we may develop interventions to improve the experience and well-being of people in the work place. This section of the study will be specifically focused on finding player that are highly involved in guilds or clans in an online video game. Examining these variables in a virtual environment will help tell us what similarities and differences exist between these guilds and real world jobs. By identifying what similarities and differences are between these two environments, employers can better create their work environment to help have more committed and engaged employees.

Small Molecule Inhibition of CARM1 in Adipocytes to Control the Epigenome-Induced Risks of Obesity

Dhairya Shukla
Dr. Richard Meagher, Genetics, Franklin College of Arts & Sciences

Obesity is the condition of having excess body fat, and a Body Mass Index greater than 30. Obesity has reached epidemic proportions with 35% of adult Americans being obese. It is also the leading cause of preventable death in the USA, making it one of the top research priorities. Obesity results from the increased production and size of adipocytes in adipose tissue. This results from imbalance between food intake and energy expenditure, leading to an excessive accumulation of adipose tissue. The health risks of obesity and the difficulty individuals have losing weight is explained by epigenetic factors. One such epigenetic factor, Coactivator-Associated Arginine Methyltransferase 1 (CARM1) catalyzes modification of proteins at adipogenic genes and appears essential to the transformation of preadipocytes into mature adipocytes. The cellular memory of CARM1-catalyzes asymmetric arginine modifications in visceral and subcutaneous adipose tissue (VAT and SAT) adipocytes that may impact the ability to gain and lose weight. Dr. Meagher's laboratory recently developed innovative tools to enable adipocyte-specific epigenetic analysis of chromatin structures including fluorescence activated nuclear sorting of adipose tissue nuclei and a preadipocyte cell line that fluoresces when

cells become mature adipocytes (ADNp::RFP). In this project, I will begin by inhibiting adipocyte development of this cell line using the natural product CARM1 inhibitor Ellagic Acid and then move on to pharmaceuticals newly designed to inhibit CARM1. Our translational medicine goal is to reduce obesity and its harmful comorbidities including cardiovascular disease, some cancers, type II diabetes, inflammation, and dementia testing this next in mouse models.

Designing Chiral Metasurfaces and Understanding their Optical Properties

Joseph Skehan
Dr. Yiping Zhao, Physics & Astronomy, Franklin College of Arts & Sciences

When an array of micrometer or nanometer sized chiral patterns are arranged regularly in three dimensional space, they can show unique optical properties which do not occur naturally, and can be used to tune the polarization of light. When these chiral materials are made of noble metals, such as Ag, Au, or Pt, they are called chiral metamaterial and can exhibit enhanced chiral optical properties, which may result in a wide range of applications, such as negative refractive index material, stealth coating, improved detection devices, super resolution lenses, etc. However, production of these ordered, chiral structures usually requires expensive fabrication techniques, such as electron beam lithography. Here, we propose to combine close packed nanosphere monolayers, reactive plasma etching, and oblique angle deposition to fabricate large area chiral nanostructures. Based on a MATLAB program developed in our lab and modified by me, I have predicted the etching process and the resulting chiral patterns on the substrate. With a Labview program developed by me, I can deposit chiral patterns on the substrate by controlling the substrate rotation. The resulting chiral metamaterials are then characterized by scanning electron microscope, ellipsometry, and optical transmission measurements, and demonstrate large chiral optical activity. With the help of finite difference time domain simulations, their optical properties can be predicted. We will systematically vary both the etching and deposition conditions to generate different chiral metamaterials and to establish a good relationship between the optical properties and the chiral structures.

The Political Evolution of Malcolm X

Shaunteri Skinner, CURO Summer Fellow
Dr. Carolyn Medine, Religion, Franklin College of Arts & Sciences

The legacy of Malcolm X continues to undergo reinvention as researchers gain access to his personal life through the written work he left behind. The development in the theory in his religious and political thought is an important scholarly question, particularly in understanding the changes that he made after his split from the Nation of Islam (NOI). Elijah Muhammad, the leader of the NOI, discouraged political affiliations when Malcolm X was the national minster of his organization, leaving Malcolm restless to express his public voice. In my research, I examine the period after his break from the NOI and find that this movement gave him political independence. His religious commitments intersected with his politics as well. From African thinkers, he was inspired to adopt some of the methods they had used to attain independence from colonial powers in Europe. He developed strategies that he planned to implement during political campaigns as the founder of the Organization of Afro-American Unity (OAAU). In notes from collections of personal writings, housed at the Schomburg Center for Research in Black Culture, Malcolm X detailed these plans with the help of student researchers who accompanied him at political summits in Africa. The OAAU was modeled after the Organization of African Unity (OAU), which

called for the political and social unification of African nations. With the information that I collected as I completed research in Harlem, I ask: What new insights can be deduced about the political legacy of Malcolm X from his template for the OAAU?

Diazinon Promotes Adipogenesis in 3T3-L1 Preadipocytes

Adrianne Smith, CURO Research Assistant
Dr. Xiaozhong Yu, Environmental Health Science, College of Public Health

Diazinon, a common organophosphate, has been widely used in the agricultural setting, thus exposure in the general population is possible. Studies show diazinon has neurotoxic effects in humans and animals and possible adverse effects as an endocrine disruptor. However, its association with dysregulation of adipogenesis has been poorly investigated. Obesity is an increasing health issue. Research suggests that environmental factors play a role in the obesity epidemic in addition to diet and exercise. The current study investigated the mechanism of diazinon's effect on adipogenesis by examining adipocyte differentiation after exposure. 3T3-L1 mouse preadipocytes were used as an *in vitro* model and treated with increasing doses of diazinon (0, 1, 10 100 μM). Using Oil Red O staining for visualization, lipid droplet accumulation was found to increase in a dose-dependent manner. Multiple adipogenic specific proteins were measured via Western blotting at the three stages of adipogenesis (induction, differentiation, and maturation) in each treatment condition. Diazinon significantly induced expression of transcriptional factors CCAAT-enhancer-binding proteins α (C/EBPα) and peroxisome proliferator-activated receptor γ (PPARγ) and their downstream genes fatty acid synthase (FASN) and Acetyl-CoA Carboxylase (CoA) in a dose and time-dependent manner compared to the relative controls. The current study demonstrates that diazinon promotes lipid accumulation and activates the adipogenic signaling pathway in the *in vitro* model.

Ecosystem Decomposition Using Fluxes

Erin Smith, CURO Research Assistant
Dr. Caner Kazanci, Mathematics, Franklin College of Arts & Sciences

Ecosystems are often described as flows of biomass among species, which form ecological networks. These networks can be fairly large and complex. Decomposing an ecosystem model into smaller pieces for detailed analysis is often tempting. However, essential ecosystem behavior may be lost by breaking connections, or excluding species. Ecosystems are made up of organisms and flows of biomass, but neither can function by themselves. In this research, we propose a new building block for ecosystems, called fluxes. A flux is a smaller network within an ecosystem that can sustain itself. For example, a forest ecosystem may have hundreds of interconnected species and flows, but a flux would contain grass, rabbits, wolves, and the flow between these species. Any ecosystem can be broken apart into these fluxes and examined without losing any significant properties of the full ecosystem. Furthermore, flux decomposition can be used to identify essential organisms (keystone species) or flows, because an organism or a flow may appear in multiple fluxes. We have shown that it is possible to decompose any ecosystem model into its fluxes regardless of its size or complexity. We are currently developing the algorithms necessary to automate the process so that any ecosystem can be decomposed without requiring any manual work. Our research is ongoing.

Population Dynamics and the Ecology of the Common Bottlenose Dolphin of the Central Georgia Coast

Caroline Spohn, CURO Honors Scholar
Dr. John Schacke, Odum School of Ecology

The barrier islands and estuarine system of the central Georgia coast provide a unique environment for the study of dolphin population dynamics, ecology, and behavior as one of the few areas along the eastern coast that remains largely undeveloped. Bordered to the north by Savannah and to the south by Brunswick, this area is relatively untouched by human populations and commercial industry. The study of this population of dolphins over time will provide a baseline against which to compare the results of future coastal developments on terrestrial and aquatic environments. The results of my research will be valuable to environmental protection and conservation organizations, fishery departments, coastal development activities, and state and federal agencies in efforts to preserve and protect the region. The goal of this project is to identify and measure seasonal, annual, and other periodic fluctuations in the abundance and distribution of dolphin populations along the central Georgia coast. Data will be documented photographically to identify individual dolphins and catalog them. Through this process, we are able to observe the associations between the physical environment and dolphin population and ecology, which will provide us with insight into the positive and negative effects of coastal development on habitat health. In order to complete this analysis, boat-based surveys of the region are completed in order to collect photographic and demographic data. These surveys identify individual dolphins, their distribution over time, and behavior in specific geographic areas. Identification of individual dolphins is possible because scars on dorsal fins can be as unique as human fingerprints.

Acceleration of Human Transportation and Its Impacts on Energy Consumption
Lindsey Spreen, CURO Research Assistant
Dr. John Schramski, College of Engineering

Throughout history, the transportation sector, which is one of the fundamental areas of energy consumption, has been periodically revolutionized by technological development. The adoption of each successive technology—such as roads, carriages, cars, and planes—has been akin to shifting into a higher gear, where the new technology is leveraged to allow for faster, and therefore more expansive, travel. Increased travel requires increases in energy consumption. In this project, we mechanistically model the historical kinetic energy discharge of ever increasing and faster moving human populations. By comparing the resulting values to the published energy consumed by the transportation sector, we derive an energetic efficiency of the transportation sector over historical time. Understanding this trend with additional supporting data meaningfully quantifies and conveys the enormous impact of increasing human kinetic energy on the energetic balance of the planet. This information can be leveraged to engineer sustainable solutions grounded in a mass and energy balance perspective.

Recycled Tire Chips for Use in Concrete Barrier Walls and Other Applications
Katelyn Stallings
Dr. Stephan Durham, College of Engineering

In 2013, the Georgia Department of Transportation (GDOT) constructed more than 42,000 linear feet of concrete barrier utilizing a Class A concrete mixture design (3000 psi). There may be potential for the beneficial utilization of recycled tire chips in concrete barrier applications which may lead to improved safety for vehicle occupants as well as reduce disposed rubber from going to landfills or stockpiles, and potentially saving materials cost for GDOT. Additionally, there may be other applications requiring less compressive strength, Class B – 2200 psi, where rubberized concrete could be advantageous. However, GDOT has not

studied recycled rubber tires for concrete barriers or other concrete related applications despite the potential for safety, environmental, and economic benefits. Concrete safety barriers are one of the widely used impact attenuators that are intended to either decelerate vehicles to a safe stop or redirect them away from a fixed object. Concrete exhibits little plastic deformation when impacted by a vehicle and thus an undesirable trait for safety barriers. This study includes a thorough review of literature pertaining to the inclusion of rubber products in concrete mixtures for transportation related applications and the design, batching, and testing of rubberized concrete mixtures for potential use in barrier walls, curb and gutter, and other non-high strength concrete applications for GDOT. Specifically, coarse aggregate (i.e. rock) will be replaced with incremental proportions of tire chips. The primary goal will be to establish a benchmark concrete mixture for which tire chip inclusion is possible without significant detrimental effects on the structural performance of the concrete. Rubberized concrete mixtures will be tested for compressive strength at 1, 7, and 28 days of age to measure their mechanical performance as tire chip content increases. Ultimately, this research will better inform additional phases of a larger-scale study.

An Environmental Engineering Challenge: Improving the Energy Balance of Global Food Production

Garrett Steck, CURO Research Assistant
Dr. John Schramski, College of Engineering

Global energy consumption continues to exponentially rise as an increasing world population, currently at 7.4 billion, requires more resources to survive. However, despite rising global per capita energy consumption, significant food availability disparities exist between countries. Decisive amounts of energy are used for transportation, urbanization, and industrial development, while food energy (edible calories) for the global population, arguably the most important energy for civilization, is not being evenly distributed. Today, approximately 2 billion people lack one or more nutrients for survival. Organizing available data for 173 countries, we compare food energy surplus or deficit to per capita energy consumption between 1980 and 2005. The results show on average that energy consumption per capita and food energy production per capita are not correlated. This indicates that excess nonrenewable energy usage is not being implemented with intentions to feed a continuously growing population. To aid policy makers, areas of improvement in excess energy consumption above the metabolic needs of the population loads are identified.

Using Mutants to Understand Mechanisms of DNA Methylation in *Brachypodium distachyon*

Madeline Steffensen, CURO Research Assistant
Dr. Robert Schmitz, Genetics, Franklin College of Arts & Sciences

The mechanisms of DNA methylation in plants have been extensively studied in the non-grass species *Arabidopsis thaliana*. While differences in the patterns of methylation have been observed in grass species, the mechanisms for these differences remain poorly understood. *Brachypodium distachyon* is an emerging model for grass species. Genes known to regulate DNA methylation are studied using the WRRC *Brachypodium* T-DNA mutant collection. Tissues from plants with suspected mutant genes are harvested. PCR and gel electrophoresis are then used to genotype the plant and determine its zygosity. This process is used to identify plants that are homozygous for the mutation of interest. Homozygous mutants are then further studied to determine the effect mutations have on DNA methylation. It is expected that genotyping will identify plants that are both

homozygous and heterozygous for mutations. Heterozygous individuals will be carried to the second generation in order to obtain homozygous offspring. Further studies of these mutants are expected to show that the mutants have altered methylation levels compared to non-mutated wild-type plants. The research will provide important information about the mechanisms of DNA methylation in grass species. In this way, we can begin to understand differences that may be present between DNA methylation in grasses and non-grass species of plants.

In Search of Optimal Designs Using Differential Evolution Algorithm

Zack Stokes
Dr. Abhyuday Mandal, Statistics, Franklin College of Arts & Sciences

In statistical practice, no matter how excellent data analysis methods are, meaningful conclusions cannot be drawn from data that were not collected carefully. To prevent this issue, designed experiments can be used to target specific research questions and avoid frivolously using resources. Experiments like these can often be very expensive for the researcher due to either a high number of runs or a high per-run cost. This cost restriction is an example of one constraint that may be in place when attempting to generate a worthwhile design. To address this issue, there are different approaches for creating optimal designs. For simpler cases, optimal designs can be obtained theoretically, using formulae and theorems; however, as technology continues to advance, the processes that are being experimented on are growing more and more complex. In these situations it is not always possible to construct an optimal design analytically. This research deals with developing new, numerical techniques for approaching these problems. The Genetic Algorithm (GA) is a popular tool that already exists for identifying these designs; however, our preliminary study has shown that another technique, Differential Evolution (DE), can outperform this algorithm. DE is a search algorithm that has applications in an array of disciplines, but its usefulness in generating designs has never been explored. The goal of this study is to understand how DE compares with other algorithms like GA and then attempt to analyze designs for which optimal solutions have not yet been found.

Detritus Preferences in a Mangrove-Saltmarsh Ecotone

Jessica Story, CURO Summer Fellow
Dr. Jeb Byers, Odum School of Ecology

Climate change is driving range expansions of species worldwide, and warming temperatures are causing global shifts in species distributions to higher latitudes and elevations. In Florida, mangrove forests are advancing their northern limit in response to declines in the frequency of annual freezes. As the mangrove forests extend their northern boundary, they are moving into salt marsh habitats. As a consequence, the organisms in invaded marshes that utilize detritus as a resource may change or shift their food preferences to adapt to the new change in dominant vegetation. To test this, litterbags filled with mangrove and saltmarsh detritus were placed in 20 blocks (10 within mangrove habitat and 10 within saltmarsh habitat) along the mangrove-saltmarsh ecotone. Litterbags were analyzed individually to quantify species composition and abundance. After one month, the results showed more organisms overall in the mangrove plots over the saltmarsh plots. Within the mangrove plots, there were more organisms utilizing saltmarsh detritus than mangrove detritus. Thus, the mangrove detritus is a less than substitutable resource for salt-marsh resident species. However, this may change over time as marsh species adapt or as mangrove associated species also migrate northward.

Abstracts

Beneficial Use of Metakaolin for Georgia Concrete Pavements
Matthew Sullivan
Dr. Stephan Durham, College of Engineering

This study analyzes the use of metakaolin as a supplementary cementitious material (SCM) in concrete mixtures; particularly with the intent of adoption into current Georgia Department of Transportation (GDOT) Standard Specifications. Despite Georgia having significant kaolin deposits, GDOT does not currently allow its use for concrete pavements or other structures. During the last several decades the use of SCMs in Georgia concrete has increased and led to improved performance and lower cost. Fly ash and blast furnace slag have been the primary SCMs used for concrete pavements. Recently, the availability of these SCMs has become limited and resulted in the need to investigate alternative materials. Current research evaluating the use of metakaolin as a SCM is widespread with numerous state DOTs having already adopted specifications for its use. This research is timely in that it will be used to investigate the mechanical performance of concrete mixtures using metakaolin. Ultimately, the study results will allow for the modification of the GDOT Standard Specifications to allow its use. Metakaolin will be introduced as a partial replacement of cement for GDOT Class 1 and 2 concrete pavements. The performance will be examined using ASTM standardized tests for fresh and hardened concrete properties. The successful completion of this research will provide an economical and widely available alternative to the current SCMs being used in the state of Georgia.

Issue Framing and Beliefs about the Importance of Climate Change Policy
Meili Swanson, CURO Research Assistant
Dr. Shane Singh, International Affairs, School of Public & International Affairs

We use an experiment to examine whether the way in which climate change is framed affects individuals' beliefs about its importance as a policy issue. We employ frames that emphasize national security, human rights, and environmental importance about the consequences of climate change. Contrary to our expectations, we find no evidence that issue frames, on average, affect opinions about the importance of climate change policy. We do find some evidence that the effect of issue frames varies across ideological and partisan groups. We conclude by discussing our findings relative to extant literature and considering the implications of our findings for those who seek to address the issue of climate change.

The Effects of Iron Deficiency Anemia on Mitochondrial Capacity
Joanna Szymonik, CURO Research Assistant
Kelly-Ann Peters
Dr. Kevin McCully, Kinesiology, College of Education

Iron is an essential mineral needed by the body. In addition to carrying oxygen from the lungs to the rest of the body, iron is also an important component of enzymes that help to speed up biochemical reactions. Having an inadequate amount of iron in the body is a condition called iron deficiency. According to the World Health Organization, ~30% of the world's population is anemic. This makes it the most common nutritional deficiency in the world. With muscle weakness and fatigue being a major symptom of this condition, it can be hypothesized that a deficiency in iron may impact skeletal muscle performance. Specifically, it can be predicted that a deficiency can impair mitochondrial function in skeletal muscle. The purpose of this study was to compare the mitochondrial capacity of those with iron deficiency to controls. Participants were divided into two groups: an anemic group (n=4) and a control group (n=14). Blood samples were taken in order to

diagnosis anemia severity. Hemoglobin levels were (11.4 + 0.9 g/dL) and (14.3 + 1.3 g/dL), while the hematocrit levels were (36.0 + 4.7 %) and (40.6 + 3.3 %) for the anemic and control groups, respectively. However, there was no significant difference ($p = 0.940$) between the rate constant of the anemic (1.81/min) and control (1.82/min) groups. This study suggests that iron deficiency did not affect the capacity of mitochondria in skeletal muscle. These results suggest that symptoms of fatigue are unrelated to the impairment of iron usage in energy production.

Administration of Varying Carbon and Nitrogen Sources into a Defined Growth Media for Polysaccharide Secretion in *Bacillus cereus*

Syed Tahmid, CURO Research Assistant
Dr. Maor Bar-Peled, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

The endospore forming *Bacillus cereus* species was recently shown to produce an exocellular polysaccharide (EPS) during later stages of sporulation. The biofilm is composed of an extracellular polysaccharide named X-polymer. While the structure of this X-polysaccharide was recently elucidated in our laboratory, less was known about the mechanism that regulates its formation. Here, we first showed that when *Bacillus* is growing in rich bacterial medium, a medium that support vegetative growth, both the EPS or the spores do not form. To further examine specific nutrient(s) that support glycan formation, we used a different medium. For these studies we used a defined medium containing different sources of carbon, nitrogen, or a combination of the two factors. Following bacterial growth, the polysaccharide was isolated and its composition was determined after hydrolysis by gas chromatography mass spectrometry (GC-MS). The relative amount of the polysaccharide as well as other glycans were recorded. In the presentation I will describe in details our findings.

Influences of Predators on Parasite Prevalence in *Crassostrea virginica*

Meghan Tait, CURO Research Assistant
Dr. Jeb Byers, Odum School of Ecology

Host-parasite relationships do not occur in isolation. It is increasingly recognized that other species, like predators, may both directly and indirectly influence the dynamics between hosts and parasites. If predators preferentially feed on infected or uninfected hosts, they may influence parasite prevalence in the remaining host population. Furthermore, when predators feed on infected hosts, they may release parasites from the prey facilitating their spread to new hosts. In this study we investigated if the blue crab, *Callinectes sapius*, preferentially selects prey (the eastern oysters, *Crassostrea virginica*), infected by one of its most prevalent parasites, *Perkinsus marinus*. Using a series of choice trials in laboratory mesocosms, we presented blue crabs with two oysters. Once the crab had committed to consuming one oyster, we removed both oysters from the mesocosm and assessed their *P. marinus* infection status. Using all trials that included a choice between one infected and one uninfected prey, we analyzed the preference of each predator. Blue crabs did not exhibit preferential feeding as a function of *P. marinus* infection status. Our data thus suggests that crab predators will not alter prevalence patterns of oyster populations through differential predation. This gives us a better understanding of the relationship between the biotic environment and host-parasite interactions.

Code Switching in Tunisian Arabic

Ayman Tartir
Dr. Timothy Gupton, Romance Languages, Franklin College of Arts & Sciences

Few modern languages can claim a sociolinguistic history as complex as that of Tunisian Arabic. Beginning with the ancient Berber languages of the Sahara, the Tunisian linguistic landscape was shaped over thousands of years by conquest and trade with nearly a dozen languages and peoples—most notably the Arabs and the French. Today, the language spoken in Tunisia is a precisely executed mélange with Arabic and French intermingling seamlessly in almost all levels of daily interaction. Code switching (CS), typically defined as the mixing by multilinguals of two or more languages in discourse on any level (Poplack 2001), has only recently become a topic of careful research. In the past, CS was thought to be a random and deviant linguistic phenomenon which lacked grammatical constraint. However, linguists have made great strides in quantifying and qualifying CS which in many cultures is fundamental to the way people communicate. From this research have emerged such theories as Poplack's 1978/81 Equivalence Constraint, which dictates that there are predictable "switching points" at which one is free to change languages. Using a corpus of linguistic data gathered from Tunisian television broadcasts, this study examines some of the most commonly switched elements, what social factors may affect them, and how they confirm the Equivalence Constraint.

UGA Campus Sustainability Initiatives: Awareness and Attitudes to Campus Recycling

Emily Taylor, CURO Research Assistant
Dr. Juan Meng, Grady College of Journalism & Mass Communication

Purpose: The purpose of this research is to identify student's awareness and attitudes to on-campus sustainability initiatives. The University of Georgia Office of Sustainability is involved in many different sustainability projects, but this paper chose to focus on one of the biggest: recycling. The research aims at discovering student's thoughts on the recycling programs on campus. *Design/methodology/approach*: The researcher used two research methods in this study to investigate the subject: (1) an online survey of UGA undergraduate and graduate students; (2) in-depth interviews with five UGA undergraduate students. *Findings*: Results suggest that students at the University of Georgia are very aware of recycling programs on campus, such as the recycling trash cans located in almost every classroom and building, and understand recycling on campus is important. Students felt less inclined to recycle at home where it is less convenient and also felt that recycling on game day is difficult. *Practical implications*: The Office of Sustainability needs to focus some of their efforts on making recycling more convenient on game days. They also should spread awareness about the importance of recycling at home and how easy it can be. *Originality/value*: The study provides insights into the awareness and attitudes of on campus sustainability programs, such as recycling. Making sustainable choices is important for the health of our planet and students need to know that they can make a difference with their efforts.

Effects of Campaign Finance on Legislator Polarization

Andrew Teal
Dr. Anthony Madonna, Political Science, School of Public & International Affairs

Gallup polls have indicated growing disapproval of Congress in recent years. Distrust with the legislative system stems from issues of gridlock and the public's perception of an ideologically polarized Congress. Polarization is problematic for both the legislative process and the American public, as it causes gridlock in policy making and rifts in societal interactions through increasing political disagreement. Therefore, it

is important to ask: what is causing Congress to polarize? Existing research shows that polarization is present and has been increasing since the 1970's. The two primary accepted causes of polarization are member replacement and member adaption. However, more specific explanations exist for increasing polarization. This research builds upon existing studies on the effects of campaign finance funding control. It is debated whether independent campaign donors or control of campaign funding by political party establishments might reduce Congressional polarization. Using state legislature data, different campaign finance laws can be simultaneously compared across state lines to analyze the effects of control over funding on polarization levels. Through data analysis, it should be evident that greater proportions of contributions by political parties correspond to less polarization in legislatures.

Biological Function of an AAK1-Like Protein Kinase in *Trypanosoma brucei*

Bryanna Thomas, CURO Graduation Distinction, CURO Research Assistant
Prof. Kojo Mensa-Wilmot, Cellular Biology, Franklin College of Arts & Sciences

Human African trypanosomiasis (HAT) is a potentially deadly disease endemic to parts of rural Sub-Saharan Africa. The causative agent, *Trypanosoma brucei,* is a protozoan parasite that proliferates in the blood, lymph, and eventually the central nervous system of humans and cattle. New potential HAT drugs may be repurposed from therapies for other illnesses, such as the compound AEE788, which was initially developed for the treatment of glioblastoma. AEE788 is a lead compound for trypanosomiasis drug discovery. An important step in mechanism of action studies is identification of pathways affected by a drug. In humans, AEE788 inhibits activity of the receptor tyrosine kinases EGFR and VEGFR. In trypanosomes, AEE788 is associated with several protein kinases, including casein kinase 1.2. On the basis of these facts, we checked for the effect of AEE788 on the phosphoproteome of *T. brucei*. AEE788 treatment altered the phosphorylation state of protein Tb427tmp.160.4770 (TbAAK1), among others. This protein shares some homology with the human protein kinase AAK1, which is involved in clathrin-mediated endocytosis through interactions with adaptor protein 2 (AP2). In this study, we present results of the effect of a TbAAK1 knockdown on endocytosis pathways in the trypanosome.

Reactive Microglia as a Biomarker in a Piglet Model of Traumatic Brain Injury

Meagan Thomason, CURO Research Assistant
Dr. Franklin West, Animal & Dairy Science, College of Agricultural & Environmental Sciences

Traumatic brain injury (TBI) is a major cause of hospitalization and death in the United States, and patients with TBI often struggle with physical and cognitive impairments for months to years. The development of treatments for TBI have been performed on predominantly rodent models, but because the brain composition of mice is very different compared to humans, the research often fails to translate to human medicine. However, pig brains are more similar to human brains, which make them an appealing alternative for treatment development. The objective of this study is to assess changes in brain cellular composition in a piglet model of TBI. Piglets underwent surgery to receive a controlled cortical impact (CCI). Piglets were sacrificed one day, one week, and four weeks post-TBI and brain samples are collected for analysis. Microglia, which secrete inflammatory cytokines in response to injury, were quantified by immunohistochemistry utilizing Iba1 antibody. We expect that microglial activation will occur as early as one day post-TBI and will peak one week post-TBI. After

four weeks, we expect less activated microglia presence as they begin to return to a resting state. These research findings will be used to determine a normal pattern of TBI pathophysiology to serve as a platform for the development of effective treatments for TBI.

The Doctrinal Development of Sea-Launched Nuclear Capabilities

Bert Thompson, Foundation Fellow, CURO Research Assistant
Dr. Sara Kutchesfahani, International Affairs, School of Public & International Affairs

India, China, and Pakistan have transformed the face of South Asia over the last several decades. The rise of economic power in the region, coupled with the growth of conventional military might, has generated fierce strategic competitions between India and China, as well as between India and Pakistan. However, the development of nuclear arsenals in India, Pakistan, and China may be of the greatest concern to the international community. In this paper, the author examines the development of sea-launched nuclear capabilities, commonly in the form of ballistic missile submarines, among the Asian powers. He further observes the role of these developments on the nuclear doctrine of each individual state. He finds that India, Pakistan, and China have all faced similar problems in developing their sea-launched nuclear platforms, including challenges to their command-and-control practices and methods of storing and deploying nuclear-armed delivery vehicles. The policy implications of nuclear developments in and around South Asia – namely, the prospect of nuclear war – require attention from the international community.

Has *Laïcité* Transformed into a Law of Islamophobia?

Chelsea Thorpe, CURO Research Assistant
Prof. Lihi Ben Shitrit, International Affairs, School of Public & International Affairs

On November 13, 2015, terrorists unleashed a series of attacks on Paris, killing and injuring more than 125 civilians. As with the Charlie Hebdo attacks earlier that year, the shooters were of Muslim background. The aftermaths of these attacks again brought attention to France's 1905 *laïcité* law. As stipulated by *laïcité*, displays of any religious symbol, including, among other things, prayer, headscarves, and niqabs are severely restricted in the public sphere. Many French politicians use the 1905 law as a pretext for aggressive integrationist policies toward religious minorities. Yet, as a result, some argue, French society has further segregated and *laïcité* has become a form of religious suppression that inequitably targets certain religions and not others. This research highlights questions of religious freedom in relation to the integration of Muslim immigrant communities in France as they are being tested today in social and legal discourse. With a focus on Catholicism, a historical analysis of French majority and minority frameworks provides a thorough understanding of the legislation that led up to *laïcité*. Instead of integrating French society, recent "modifications" to *laïcité*, specifically the bans on the headscarf and the veil, have caused reverse integration by promoting strong Catholic morals as well as secular republican nationalism that excludes pious Muslim members of society. Varieties of Islam and French republican secularism clash as Muslim individuals struggle to form self-identities while simultaneously integrating into society. This study draws on qualitative analyses of local and national French newspaper articles in addition to recent academic literature.

Financial Knowledge amongst College Freshmen

Danei Ting
Dr. Brenda Cude, Financial Planning, Housing & Consumer Economics, College of Family & Consumer Sciences

Financial literacy is the capability to interpret how money works in society and how it is managed. For my research, I want to learn how financial courses are related to the financial knowledge and behavior of college freshmen. For my research, I was able to analyze college freshmen data collected through an online survey. I utilized Excel to filter out the data so I could segment my target group of freshmen students who attended high school in the state of Georgia. This group consisted of 288 students. My focus was questions related to financial literacy. The first question I examined was, "How would you describe how much you learned in course(s) about personal finance/money management in high school?" Ninety-nine of the 288 students responded that after taking the course they knew much more about money management, while 88 were neutral. Looking deeper into the survey I discovered the top two topics covered in high school personal finance courses were financial planning and investment strategies, each with over 100 students. Another question asked whether taking financial-related courses in high school helped the students improve their financial management behaviors. Only 4 students responded that taking a course did not help while the rest answered that taking these courses not only improved their knowledge, but their financial behavior as well. By analyzing these results, I discovered that the surveyed students believed that taking a financial course in high school definitely improved their knowledge and their financial behaviors.

Determining Gene Products Interacting with RtcB of the rsr-rtcBA RNA Repair Operon via a Synthetic Lethal Screen

Isabella Tondi Resta, CURO Research Assistant
Dr. Anna Karls, Microbiology, Franklin College of Arts & Sciences

Infections caused by *Salmonella* are among the most common food-borne diseases in the United States, causing thousands of hospitalizations yearly. Due to the increasing resistance to most effective antimicrobials, new targets in *Salmonella* for antimicrobial development must be identified. Our laboratory has identified a potential target as a novel RNA repair complex that is hypothesized to comprise three proteins, Rsr, RtcA, and RtcB, and two Y RNAs. The complex is encoded in a single operon whose expression is controlled by the transcriptional activator, RtcR. Expression of the RNA repair operon is induced by treatment with the antimicrobial mitomycin C (MMC) and cell viability increases in the presence of MMC. In order to further characterize the function of the RNA repair genes, a genetic screen for synthetic lethal mutants on MMC was developed to identify other genes whose products interact or cooperate with the RNA repair complex. In this work, a *Salmonella* strain that was deleted for the RtcB gene, an RNA ligase, and contained an unstable plasmid encoding *rtcB* was used for transposon mutagenesis to identify other gene products that specifically interact with RtcB. Synthetic lethal mutants could only survive in the presence of MMC if they maintained the unstable plasmid expressing *rtcB*. The transposon insertion site was determined for all apparent synthetic lethal mutants, thereby identifying genes whose disruption causes a synthetic lethal phenotype in the absence of *rtcB*. The potential function of these genes in the proposed RNA repair system of *Salmonella* will be addressed.

Investigating the Phenotypic and Genetic Mechanisms of Root Architecture Traits in Cultivated Sunflower Seedlings under Drought Stress

Nicole de Leon Torralba, CURO Research Assistant
Dr. John Burke, Plant Biology, Franklin College of Arts & Sciences

Approximately 70% of worldwide water is allocated for use in agriculture in the form of irrigation, thus loss of water is the greatest threat to crop productivity. With impending changes to the climate, droughts are predicted to increase in severity, intensity, and duration further limiting water availability for crop production. As such, the focus of this study centers on root architecture and a crop's ability to resist low water availability. First, we determined the natural phenotypic diversity in root architecture traits using cultivated sunflower *(Helianthus annuus L.)* as a model system. Cultivated sunflower seedlings from an association mapping population containing 272 lines were subjected to a well watered control and polyethylene glycol (PEG-6000) stress induced treatment. Root systems were dissected at 2 cm and analyzed using the imaging program, WinRHIZO v2, to determine various architecture traits in both the top and bottom portion. Results indicate significant root allocation differences between top and bottom, control and stressed, and the interaction indicative of a drought avoidance response. Second, we performed a genome wide association study (GWAS) to investigate the underlying genetic mechanisms of these root traits. GWAS analyses are still ongoing; however they should yield candidate genes and regions associated with these traits. This work will inform downstream molecular breeding approaches aimed at producing cultivated lines able to survive under low water availability.

Recycle or Landfill? Assessing the Efficacy of a Green-Themed Intervention

Lawrence Towe, CURO Research Assistant
Dr. James Coverdill, Sociology, Franklin College of Arts & Sciences

Problem Statement: Recycling programs have increasingly paired bins labeled "landfill" and "mixed recycling" to encourage and facilitate recycling. This study explored the accuracy of recycle-or-landfill placement behavior and a mechanism for behavior change.
Methods: Data came from a series of "waste audits" conducted in freshman dorms at the University of Georgia during the 2015 Fall Semester. A first audit was conducted the week before an energy- and water-conservation competition (the "Green Cup Challenge"). Three "intervention" dorms targeted by the Challenge were included along with a comparable "control" dorm that was not. Additional waste audits were conducted after the Challenge concluded and repeated a month later. In each dorm, waste-audit materials were collected from two floors and catalogued, producing 24 total audits and 2,362 individual items. *Findings*: Overall, 80% of items in landfill bins and 59% of items in recycling bins were correctly placed. The two most common misplaced items were plastic film and plastic food wrappers (56% of each were misplaced as recyclable); the two most common correctly placed items were cardboard and plastic bottles (88% of each were correctly placed in recycle bins). Dorms targeted by the Challenge showed no increase in placement accuracy, a pattern also found at the control dorm. *Significance*: Incorrect placement of items contaminates mixed recycling streams, creating an added cost to processing facilities, thereby decreasing the overall value of recyclables. The intervention studied here failed to increase placement accuracy. A follow-up study is underway in an effort to identify an effective behavioral intervention.

Impact of Video Captions in Mobile News

Kendall Trammell
Dr. Bartosz Wojdynski, Grady College of Journalism & Mass Communication

Mobile devices are one of the leading ways in which media audiences are consuming news. The present study sought to examine the impact of the presence of video and video captions in mobile news on attention to the news content, recall of news content, and

attitudes toward the news content. In a single-variable, 3-level between-subjects design (text and image story, video without caption, video with captions), participants (*N*= 83) viewed an online news story on a smartphone while having their eye movements and fixations recorded by an eyetracker and scene camera. Participants were randomly assigned to one version of the news story. The stories and video contained information about the importance of primary debates during presidential elections. After viewing the story, participants completed a questionnaire containing dependent measures, including knowledge, attitudes, fluency and perceived credibility. Preliminary results show differences between story conditions on story recall and attitudes toward the story. Participants who viewed the video versions of the story received higher knowledge scores than participants who viewed the text story; there are no differences when it comes to fluency (ease of use) or perceived credibility. Visual attention results are still being analyzed from the eye-tracking data. These findings are important because there is little research on mobile news consumption. This data is useful to the journalism industry because it enables digital producers at media organizations to make more informed, effective decisions when presenting news stories to the public on mobile platforms, and, thus increasing its audience engagement.

Blackout, the New Binge: A Case Study on Underage Drinking Patterns at the University of Georgia

Madison Turner, CURO Research Assistant
Dr. Susan Haire, Political Science, School of Public & International Affairs

From 2012-2015, the University of Georgia has made a consistent appearance on Princeton Review's annual list of Best Party Schools due to the collegiate underage drinking culture in Athens, Georgia. This paper explores the current underage drinking patterns at the University of Georgia by analyzing all publicly documented cases of underage drinking from the University of Georgia Police Department during the 2012-2015 timeframe. The research yields startling results. Data show that the eighteen-year-old and nineteen-year-old age categories require both UGAPD intervention and EMS treatment far more often than the 20-year-old age category. Across all age categories, the percentage of cases requiring EMS treatment has been increasing rapidly since Spring 2013. To test for a relationship, a linear regression was performed on the dataset with case number (time order) serving as the independent variable and blood alcohol concentration (BAC) levels as the dependent variable. The ANOVA table significance column value of .002 shows that BAC levels are, in fact, increasing over time. Underage students in 2015 are drinking to dangerously high levels of intoxication, surpassing the BAC levels known to originate from "binge" drinking, and instead, reaching levels that correlate with extreme intoxication, known by collegiates as "blackout" drunk. Therefore, there is evidence to show that when it comes to underage drinking patterns at the University of Georgia, "blackout" is the new "binge."

Testing for a Correlation between History of Shoulder Injury and Functional Movement Screen Score

James Tyson
Dr. Cathleen Brown Crowell, Kinesiology, College of Education

Studies have suggested that poor performance on a functional movement test contributes a 4.7 times greater increased risk of injury in athletes. However, it is unclear how a previous injury may affect functional movement test scores. Our objective was to determine if there is a significant relationship between history of shoulder injury and

Functional Movement Screen (FMS) score for shoulder mobility. Our participants were collegiate club rugby players **(**n=25; 13 female, 12 male; age=20.6±1.2years, height=172.2±9.0cm, weight=80.6±16.8kg). The athletes underwent a full FMS screening by a trained rater prior to a fall rugby season. Previous shoulder injury was defined as any self-reported or medically diagnosed injury or discomfort of the shoulder that affected sport participation. A point-biserial correlation test was used to determine the relationship between the presence of previous shoulder injury and FMS shoulder mobility score. No significant correlation between presence of previous shoulder injury and FMS score for both right (rpb=0.35, rpb2=0.12, p=0.08) and left (rpb= 0.03, rpb2= 0.001, p=0.90) shoulder mobility was found. There was no significant correlation between a previous shoulder injury and FMS shoulder mobility. Previous shoulder injury does not appear to be related to current FMS shoulder mobility score. Clinicians should be able to apply the shoulder mobility FMS test to athletes to interpret injury risk, regardless of previous injury.

The Use of Entertainment Education to Teach Nutrition Messages to Preschool Children: A Feasibility Study

Emily Tyus
Dr. Caree Cotwright, Foods & Nutrition, College of Family & Consumer Sciences

Twenty percent of US children are overweight or obese before they enter kindergarten. To address this problem, health intervention must begin in early childhood. An ideal location to deliver nutrition education is in childcare centers because of the amount of time spent in that environment. One way to promote healthy behavior to young children is to encourage higher intakes of fruit and vegetables. The purpose of this study was to examine the feasibility of using an entertainment education nutrition intervention (i.e. interactive performance lessons) to teach nutrition messages to young children. Researchers conducted a feasibility study at a childcare center in Athens, Georgia for children ages 3 to 5 (Teachers n=8 and Children n=37). The Freggie's Green Machine intervention included theater-based nutrition lessons and tastings for three fruits (blueberries, pears, and kiwi) and three vegetables (carrots, sweet potatoes, and broccoli). The program was conducted for 6 weeks with one new fruit or vegetable being introduced each week. Freggie (fruits + veggies), a fun character, promoted healthy choices with his Green Machine (fruit and veggie cart) by performing skits. Freggie's Friends, life-sized fruit and vegetable characters, accompanied Freggie to teach during performances. Changes in preschool children's willingness to try fruits and vegetables and preferences were measured. Results showed improvements in preschool children's willingness to try fruit and vegetables. Teachers and parents reported high program satisfaction and that children related to the Freggie characters. Findings indicate that entertainment education is a feasible and promising way to teach nutrition messages to preschool children.

Feeding the Urban Stream: How Nutrients and Microbes Impact Stream Carbon Reserves

Rachel Usher, CURO Summer Fellow
Dr. Amy Rosemond, Odum School of Ecology

Healthy streams and the ecosystem services they provide depend on energy to fuel the food web. Carbon (leaves and wood) from terrestrial landscapes is a vital source of energy for headwater streams where sunlight is limited. This carbon, along with colonizing microorganisms including bacteria and fungi, support stream life. Respiration (CO_2 loss) from microorganisms and associated mass loss rates of carbon deplete the amount of

carbon available for consumers. Streamwater nutrients and contaminants, which can both be elevated in urban streams, can stimulate or suppress microbial activity, respectively. We tested for these effects measuring respiration and breakdown rates on standardized carbon substrates in 9 streams in Athens-Clarke County, GA that differed in urban-derived inputs. Surface water nutrients, dissolved nitrogen (DIN), phosphorus (SRP), and conductivity (a surrogate for contaminant inputs) were measured and correlated to microbial respiration and breakdown rates. Streams with higher concentrations of phosphorus exhibited higher respiration and breakdown rates on carbon substrates, resulting in roughly doubling these rates across the 9 streams; no effects were due to either conductivity or DIN. These results suggest that phosphorus concentrations, which are typically elevated in urban streams, may impact the retention and transport of energy sources in streams.

The Role of Intraflagellar Transport in Ciliary Gliding

Rachel Vaizer
Dr. Mark Farmer, Biological Sciences, Franklin College of Arts & Sciences

The ability of cells to move through their environment is one of the most ancient attributes of living cells. One way in which cells can move is known as ciliary gliding, and it is thought to be both ancient and conserved, even among human cells. Developing an understanding of the mechanism of ciliary gliding in Euglenid flagellates may help us understand this mechanism in other cells. This study is designed to examine the role intraflagellar transport (IFT) plays in ciliary gliding, specifically the location of the IFT particles. The IFT protein complex plays an important role in transporting materials needed for the maintenance or assembly of flagella. As the IFT particle travels to the tip of the flagellum along the axoneme, it carries these materials. As the IFT particle travels back to the cell body, it brings materials that have already been used by the flagella and are being recycled back to the cell. To determine if the position of IFT, relative to the axoneme and the substrate affects ciliary gliding, transmission electron microscopy (TEM) was used to visualize the locations of IFT particles in the cilium. Visualization of the IFT complex can help to determine the role IFT may play in ciliary gliding.

Localization of Casein Kinase 1.2 in *Trypanosoma brucei*

Haley Vale
Prof. Kojo Mensa-Wilmot, Cellular Biology, Franklin College of Arts & Sciences

Trypanosoma brucei is a protozoan parasite responsible for human African trypanosomiasis (HAT). Drugs currently used to treat HAT are highly toxic and difficult to administer; new drugs must be developed. Casein kinase 1.2 (CK1.2) in *T. brucei* plays a vital role in cell division, particularly replication of the basal body (a microtubule-organizing center for flagella), and as such is an attractive candidate for lead drug discovery. In order to investigate possible mechanisms of regulation and gain a better understanding of how TbCK1.2 regulates basal body duplication, enzyme localization studies were performed using both genetic tagging methods and cell-penetrating peptides containing a fragment of TbCK1.2. Genetic tagging was performed endogenously through transfection of a construct containing the TbCK1.2 coding sequence as well as the coding sequence for an epitope tag. Cell-penetrating peptide TP10 was used as a delivery method for a C-terminal sequence of TbCK1.2 fused to a fluorophore. Gene tagging showed TbCK1.2 in cytoplasmic puncta, and partially at the basal body. Data will be presented on a test of the hypothesis that specific domains of TbCK1.2 are

responsible for targeting of the enzyme to the cytoplasm and/or basal bodies.

Green Power Solutions for Georgia
Ian Van Giesen, Haidi Al-Shabrawey
Prof. David Porinchu, Geography, Franklin College of Arts & Sciences

The purpose of this policy research is to delve into the fundamental legislation inhibiting Georgia's transformation from mainly fossil powered electric generation to mainly renewable energy generation. First we focus on why Georgia should adopt alternative energy from three different perspectives: environmental, health and economic. As well, we present an effective renewable energy policy alternative to Georgia's current legislation. As evidence, we examine various national and global initiatives designed to increase rate and scale of green energy adoption.

The Role of Cas1, Cas2, Csn2, and Cas9 in the Type II CRISPR-Cas Adaptation
Nikita Vantsev, CURO Honors Scholar
Dr. Michael Terns, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

CRISPR-Cas, prokaryotic adaptive immune systems, provide a significant advantage for bacteria and archaea in their defense against invaders such as plasmids and phages. The three-phase systems work by first integrating fragments of invader DNA into the CRISPR loci of the host genomes followed by synthesizing crRNAs from the incorporated fragments, and lastly, preforming crRNA guided silencing of invaders by Cas proteins. Genetic studies showed that in Type II CRISPR-Cas systems, proteins Cas1, Cas2, Csn2 and Cas9 are involved in adaptation. My project focuses on using biochemical approaches to understand the molecular mechanism in the initial spacer acquisition in Type II CRISPR-Cas systems We demonstrated that Cas1 performs a non-specific transesterfication reaction on the branched dsDNA We also identified complex formations of Cas1, Cas2, and Csn2. We aim to discover individual functions of these proteins and protein complexes.

Proteomic Profiling of a Model Species (Medaka Fish) to Study the Physiological Response to Chronic, Low Level Ionizing Radiation in the Environment
Jerin Varghese, Jason Moraczewski, Brittany Tummings
Dr. Carl Bergmann, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

Ionizing radiation (IR) is recognized to cause proteomic changes in various organisms. Most prominent studies performed in the field of proteomics primarily focus on the effect of radiation at acute, high doses. However, very little is known about the biological responses of organisms when exposed to chronic, low levels of ionizing radiation. This study seeks to answer the research question: What are the physiological responses associated with exposure to chronic, low- dose IR in the model species Medaka (*Oryzias latipes*)*?* The proteome of Medaka is analyzed to quantify any changes that have occurred due to exposure to low levels of IR. The first part of the project is aimed to standardize the methodology for protein extraction and protein fractionation using a control group and a high dose group. Medaka were first irradiated at the Savannah River Ecology Laboratory (SREL). Following irradiation, in-gel trypsin digestion and liquid-chromatography and mass spectrometry (LC-MS) techniques were used to identify the unique proteins found in the control and high dose group. A total of 1013 unique proteins were discovered between the control and high dose samples and are currently being characterized using bioinformatics tools.

Prevalence of Current Season Injuries in Collegiate Club Rugby Players with a Previous Injury History

Alyssa Varsalona
Dr. Cathleen Brown Crowell, Kinesiology, College of Education

Injuries are prominent among rugby players due to the contact nature of the sport, but it is unknown if individuals with a history of injuries are more susceptible to sustain subsequent injuries. The purpose of this prospective study was to determine if previous injury history increased the occurrence of current season injuries among collegiate club rugby players during a fall semester. Participants were evaluated for self-report previous injury history and Functional Movement Screen (FMS) scores. The data were obtained from 25 participants (13 female, 12 male; age=20.58±1.21yrs, height=172.19±8.95cm, weight=80.64±16.84kg). A point-biserial correlation was used to determine the relationship between the presence of previous injury history and the frequency of current season injuries. Of the 25 participants, 20 (80%) reported having at least one previous injury, while 5 (20%) reported having zero previous injuries. A moderate positive correlation was observed between previous injury history and current season injuries ($r=0.39$), bordering on significance ($p=0.054$). Previous injury history explains 15% of the variation in current season injuries ($r^2=0.15$). Although the strength of this relationship appears to be moderate, it is likely influenced by a number of additional factors. Due to these confounding factors, we cannot conclude that a history of injury directly increases an athlete's chance of sustaining injuries in subsequent seasons. In the future, it would be beneficial to further examine what confounding factors exist and to what degree of influence.

DARC Expression in Triple-Negative Breast Cancer

Juhi Varshney
Dr. Melissa Davis, Genetics, Franklin College of Arts & Sciences

DARC (Duffy Antigen Receptor for Chemokines) is now primarily known for its role as a blood group antigen and is functionally recognized as an atypical chemokine receptor. DARC is associated with a host of inflammatory and angiogenic chemokines that are linked to cancer growth. The Duffy Null allele (Fy-) is one polymorphism that has long been associated with malarial resistance but was recently linked to altered regulation of DARC isoforms. The resulting Fy- phenotype exhibits the absence of DARC expression on red blood cells as well as distinct inflammatory responses. Over 98% of West Africans and 50-80% of African-Americans express this phenotype, compared to less than 1% of their European-American counterparts. Triple negative breast cancer is an exceptionally aggressive form of breast cancer that does not exhibit estrogen receptors, progesterone receptors, or HER2 receptors, making it a difficult cancer to target during treatment. It is well-documented that African and African-American women get triple-negative breast cancer at rates much higher than other women, and there is evidence that the DARC isoform variations may be linked to aggressive breast cancer. The objective of this research is to explore if and how the Fy- phenotype contributes to the rapid growth of triple negative breast cancer by examining the expression of differential DARC protein products in both triple-negative and healthy cell lines through Western blot. This study is ongoing, but it hopes to explain differences in triple-negative rates in women of different ancestry groups while providing insight into innovative treatment for the disease.

Abstracts

Computational Investigations of H2-HD Collisions in the Interstellar Medium

Clark Veazey
Dr. Phillip Stancil, Physics & Astronomy, Franklin College of Arts & Sciences

When we want to study the behavior of distant objects in the universe, we rely on measurements derived from astronomical observations. This is done by means of spectroscopy, as the only data available is in the form of radiation being transmitted to us from the source. Ideally, we can interpret this light, which is emitted by molecules throughout the interstellar medium, to understand the way that these molecules are behaving, which describes the temperature and therein the energy of the source. In order to interpret these observations, accurate dynamical information on interstellar molecules is needed. Most of the observable infrared radiation in the universe is emitted by excited molecules due to collisional processes in the interstellar gas, making accurate data on the rate of molecular collisions of salient interest to astronomical endeavors. Here, we evaluate the probability of H2 (Dihydrogen) and HD (Deuterium-Hydride) collisions as these species played important roles in star formation shortly after the Big Bang. We are interested in HD since it has a finite dipole moment and hence is a strong radiator, and H2 due its large abundance in the early Universe. Using a public-domain scattering package, cross-sections of H2-HD collisions are computed for a selection of rotational states over a range of relevant kinetic energies, then integrated to produce rate coefficient. We will also examine the critical density and cooling function associated with this process which will aid in studying non-equilibrium cooling/excitation and possible spectral signatures from the formation of the first stars.

Regulation of DARC Isoforms among Ancestry Groups and Associations with Aggressive Breast Cancer Subtypes

Kathryn Vollum, CURO Graduation Distinction
Dr. Melissa Davis, Genetics, Franklin College of Arts & Sciences

Despite the fact that White women are more often diagnosed with breast cancer, African-American women have more severe and deadly cases. Clues surrounding the tumor behavior in African-Americans point to physiological contexts and the immunological microenvironment of the cancer sites. We hypothesize that higher mortality rates coupled with lower incidence of breast cancer in this population suggests susceptibility is not necessarily a predisposition to cancer, but once a malignant cell forms, the individual's physiological make-up drives the aggression of tumors. We further hypothesize that chronic pro-inflammatory status and altered chemokine profiles in this population are key to tumor progression disparities. We are investigating the role of the ACKR1/DARC gene and its isoforms in influencing a woman's chance of developing aggressive breast cancer subtypes. We aim to demonstrate that altered expression of DARC isoforms plays a role in breast cancer severity by regulating the infiltration of specific immune cell types into the tumor environment by altering the levels of chemokines. We are investigating how the Duffy null allele, prevalent in all women of African descent, affects the ability of transcription factors to properly express ACKR1/DARC in epithelial and lymphoblast cells. Using bioinformatics and ChIP-PCR, we aim to define more precisely the transcription factors responsible for DARC isoform regulation. Currently, we are investigating the roles of GATA1 and GATA3. Once we know what transcription factors are involved with epithelial expression of DARC, we can develop tools to further investigate how

DARC plays a role in tumor progression in women of African descent.

Impact of Investment Bank Advisers on Merger Premiums and Merger Closing Times

Haris Vukotic
Dr. Jeff Netter, Banking & Finance, Terry College of Business

In an era of low growth, many companies turn to mergers and acquisitions as a way to scale up their operations by cutting synergistic costs and increasing revenues. This paper examines the impact of deals on the equity value of the acquired company and possible causes for this impact, also known as a merger premium. Data consists of company financial results, industry specifications, and investment bank advisors, among other deal-related metrics for mergers and acquisitions that have total values of over one billion dollars. I will test which variables drive a deal premium the most; for example, if companies within certain industries command higher premiums due to their growth prospects, or if a selected investment bank advisor results in higher or lower deal premiums, or quicker closing times, on average as compared to their competitor. The results of this study could be novel and interesting in that there is no available literature on which investment bank advisor delivers the best results for their clients in each sector; much of the business is driven by qualitative prestige factors. Preliminary data analysis indicates that certain banks are much more effective than others in demanding higher deal premiums in their sell side engagements and closing their deals in a shorter time frame within parallel industries.

Statistically Modelling the Determinants of Pathogen Transmissibility in Humans

Joseph Walker, CURO Research Assistant
Dr. John Drake, Odum School of Ecology

Every year, emerging infectious diseases enter the human population from external sources and cause outbreaks. After making the jump from its reservoir, a pathogen's impact is primarily a function of its ability to transmit between humans. The goal of my research is to investigate which pathogen traits are the most important determinants of transmissibility, quantify those relationships, and develop predictive models which can be applied to newly discovered pathogens. I have reviewed the literature and compiled a database of all known human viral and bacterial pathogens and associated biological and ecological variables. Machine learning is a field of computer science that concerns identifying complex patterns in data. I am now in the process of fitting boosted regression trees, one method for machine learning, to the data with the goal of developing models which can be used to predict and explain pathogen transmissibility. Preliminary results indicate that these models may be able to predict the transmissibility of viruses in humans with reasonably high accuracy. We've quantified the relationship between the biological and host variables of viruses and their transmission propensity in humans. While it is difficult to discern correlation and causation in these relationships, a framework for predicting the transmissibility of a virus would have immediate value for public health emergency preparedness. Our efforts to model the transmissibility of bacteria have been less successful. This wasn't wholly unexpected, as bacteria are orders of magnitude more complex than viruses and are generally less dependent on transmission for survival.

Large-Scale Plasmid DNA Purification for Gene Therapy of Hemophilia B in Dogs

Vincent Way, CURO Research Assistant
Dr. Dexi Liu, Pharmaceutical & Biomedical Sciences, College of Pharmacy

The objective of this study is to learn basic techniques for plasmid DNA purification and validate the method of cesium chloride gradient centrifugation for large-scale DNA preparation. The preparation of a large batch of pLIVE-cFIX plasmids containing the canine clotting factor IX gene was performed and the purified plasmids were used for gene therapy treatment of hemophilia B dogs, a research project focused on developing the optimal procedure for hydrodynamic gene therapy. E. coli containing pLIVE-cFIX plasmids was cultured using LB medium with ampicillin and incubated at 37°C with shaking. The bacterial cells were pelleted down by centrifugation and lysed by lysozymes containing lysis buffer to release the cytoplasmic contents. Cesium chloride gradient centrifugation procedure was used to isolate the plasmid DNA from the lysate. The extracted DNA yield achieved was approximately 20 mg from 4 liters of bacterial culture. Agarose gel electrophoresis along with restriction enzyme digestion was used to determine the purity of the plasmid DNA. Furthermore, spectrophotometric measurements of purified plasmid DNA were taken and show a ratio of 1.87. These results demonstrate that using cesium chloride gradient centrifugation is a highly effective method for large-scale plasmid purification.

Regulation of Ovarian Cancer by RGS10 and BIN1

Andrew Webster
Dr. Shelley Hooks, Pharmaceutical & Biomedical Sciences, College of Pharmacy

Ovarian cancer is the deadliest gynecological malignancy, and the poor prognosis of ovarian cancer patients is largely a result of the high incidence of chemoresistance in recurring tumors. Understanding and reversing the development of chemoresistance is critical to improving outcomes for ovarian cancer patients. Regulator of G-protein Signaling protein RGS10 has been shown to play a critical role in ovarian cancer cell survival and chemoresistance. Suppression of RGS10 enhances cell survival and promotes chemoresistance. Similarly, the nuclear protein BIN1 functions as a tumor suppressor in multiple cancers and has also been shown to play a key role in ovarian cancer chemoresistance. The pattern of BIN1 expression and function is strikingly similar to that of RGS10, but no functional link between the two proteins has been demonstrated. In the current study, we explore the possibility that BIN1 functionally interacts with RGS10 in an ovarian cancer cell model. Our data suggest that RGS10 and BIN1 may work together in a concerted mechanism to regulate ovarian cancer survival. We have demonstrated that siRNA mediated knock-down of BIN1 yields a near-complete reduction of RGS10, while overexpression of BIN1 yields increased RGS10 levels. Additionally, the ability of BIN1 overexpression to increase cancer cell sensitivity to chemotherapeutic drugs can be partially reversed by a subsequent knock-down of RGS10, indicating the effects of BIN1 and RGS10 on chemosensitivity are integrated. Better understanding role of RGS10 in mediating the effects of BIN1 can provide valuable insight into cancer progression and how to address the issue of chemoresistance.

Pathological Assessment of a Piglet Model of Traumatic Brain Injury Utilizing Non-Invasive Magnetic Resonance Imaging

Madelaine Wendzik
Dr. Franklin West, Animal & Dairy Science, College of Agricultural & Environmental Sciences

Traumatic brain injury (TBI) is a major cause of death and disability in the United States. Stem cell therapies offer a promising treatment for TBI by producing regenerative and anti-inflammatory growth factors while

also functioning as a cell replacement therapy. Animal models not truly representative of the human condition have impeded development of a translatable TBI treatment, suggesting a more human-like animal model, such as a piglet, is necessary for developing a successful cell therapy. Magnetic resonance imaging (MRI) is pertinent in the analysis and treatment of TBI, and combining multiple MR parameters provides a comprehensive understanding of TBI pathophysiology. We hypothesize that controlled cortical impact (CCI) TBI in piglets will result in substantial deficits at the lesion site that can be measured and quantified non-invasively through MRI. TBI was induced in six male piglets. After 24 hours post-TBI, T2 FLAIR was implemented to visualize the lesion. Midline shift, lesion size, brain swelling and edema will be measured from the T2 weighted coronal images. Analyzing the multiple MR parameters will illustrate the differences in the injury 1-day post TBI and 12-weeks post-TBI. A reduced midline shift, lesion size, brain swelling and edema are expected 12-weeks post-TBI as damaged tissue is removed and the brain undergoes global regeneration and remodeling. Development and characterization of key cytoarchitectural changes in the CCI TBI piglet model utilizing MRI in this study will enable more robust and predictive assessment of novel therapeutics and treatments that will likely lead to more success in human clinical trials.

Forensically Influential Beetle Fauna in the Spring

Garrison West, Markus Cleveland, Alan Bosworth, Alexandria Lushaj
Dr. Marianne Shockley, Entomology, College of Agricultural & Environmental Sciences

What beetle fauna colonize carrion in the spring, and which stage of decay is the best time to find each beetle family? Forensic entomology plays a crucial role in urban and criminal court cases. Insects can unlock the hidden truths of a story that investigators may not uncover otherwise. Sadly, there has not been much research done in the field of forensic entomology and that is why we want to conduct this experiment. For our experiment, we are going to be examining beetle fauna that colonize carrion during the spring. The point of this experiment is to follow up on comparable research that was implemented in the fall. The trial conducted in the fall was extremely successful and will be the guideline for this research. As previously mentioned, there has not been much exploration of forensically important fauna. The science we will uncover can help forensic investigators in estimating a post mortem interval in potential homicide cases. The start of the experimental method will be to obtain a pig killed by a single gunshot wound to the head. Next, the pig will be placed in a cage to protect it from scavengers. After the simulated crime scene is in place, pitfall traps will be stationed around the pig, and the beetle fauna from the traps will be collected and examined. The results will be correlated with the fall data and will be arranged in an orderly manner to give an accurate comparison. Using this comparison we will create our presentation for the symposium and attempt to publish a written work of the results.

Social Perceptions of the Impacts and Benefits of Non-Native Species in the Garden: The Case of Chinese Privet in the Southeastern U.S.

Lindsey White, CURO Research Assistant
Prof. Eric MacDonald, College of Environment & Design

This study explores social perceptions of the impacts and benefits of non-native species in garden settings, focusing specifically on gardeners' attitudes toward Chinese privet in the southeastern U.S. Robert Fortune introduced Chinese privet (*Ligustrum sinense*) to the United States from China in 1852. Since

then, the species has escaped cultivation. In much of the U.S. it is widely regarded as an invasive species, and now covers a cumulative land area of roughly 3.2 million acres. Homeowners, gardeners, and institutions that perpetuate the use of *Ligustrum sinense* on their property help facilitate the further spread of the species. To better understand the reasons why homeowners may choose to plant, maintain, or remove non-native species like privet, fourteen semi-structured interviews were conducted with amateur gardeners in Athens-Clarke County, Georgia. The interview transcripts were subjected to qualitative thematic content analysis, which identified key themes and categories of responses. The preliminary interview data suggest that gardening practices are influenced by family connections, aesthetics, therapeutic benefits, and intellectual curiosity. Based on these results, the study concludes with several further questions about how gardeners' perceptions of non-native, invasive species might be changed in the future.

Implications of Inherited Microbial Profile in Long-Term Metabolic Health

Brittany Whitlock
Dr. Claire de La Serre, Foods & Nutrition, College of Family & Consumer Sciences

An obesity epidemic currently plagues the US and other western nations, threatening the health of millions across the globe. Research efforts over the last decade have pointed towards gastrointestinal microflora as a potential cause of obesity and other metabolic disorders. The following study focuses on the inheritance of obesity from mother to child, and asks whether the inheritance of unhealthy GI microbiota could be the vehicle that increases offspring propensity towards metabolic disease. Six week old female C57BL/6 mice were fed either high-fat or low-fat (control) diets, then mated. Dams were fed their respective diets throughout pregnancy. All subsequent pups were fed low-fat diets after weaning. Pups were examined for gastrointestinal microflora composition and GI tract viability. Previous stages of this study demonstrated that 21 day old pups of mother mice fed on a high fat diet (HFD) displayed significant alterations in gut microbiota composition associated with impaired GI epithelial permeability. This microbial profile has previously been associated with obesity and could increase their propensity toward metabolic disorder later in life. This project specifically explores differences between microbes of 21 day old pups and 90 day old pups, evaluating what implications the comparisons have for microbial profile persistence into adulthood.

How Does Mutagenesis of N-Linked Glycosylation Sites of C6f1 Fragment affect MAb109 Binding?

Christopher Whitlock, CURO Research Assistant
Dr. J. Michael Pierce, Biochemistry & Molecular Biology, Franklin College of Arts & Sciences

CEACAM6 is a glycoprotein found attached to the cell membrane of pancreatic adenocarcinoma cells that shows promise for use as biomarker in early pancreatic cancer screening. The five-year survival rate for pancreatic cancer is extremely low, making it important to find a reliable method of detecting pancreatic cancer at its earliest and most treatable stages. MAb109 is a monoclonal IgG antibody that binds specifically to CEACAM6, and recognition of the epitope is likely N-linked glycosylation dependent. N-linked glycans are carbohydrate chains added to proteins at consensus amino acid sequences of asparagine-x-serine/threonine as post-translational modifications. In this study, nine specific N-linked glycosylation sites on CEACAM6 were analyzed through site-directed mutagenesis of C6f1, a plasmid containing the fragment of the CEACAM6 gene expressing

its MAb109 epitope. C6f1 plasmids were mutated in order to alter specific amino acid residues of each particular N-linked glycosylation site, thus preventing N-lined glycan attachment. One test was performed with single mutations at sites N309 and T311 in order to determine if the final N-linked glycan of the C6f1 sequence affects MAb109 recognition, and a second test used nine different serially mutated plasmids, each with one more mutation than the last, for all N-linked glycosylation sites on the plasmid to examine how the loss of multiple N-linked glycans affected MAb109 binding. This study found that MAb109 would not recognize the C6f1 product without the N-linked glycan at N309 and that mutations past the first four N-linked glycosylation sites prevented the protein from being secreted by the cell.

Fracking Governance and Resistance in Western North Carolina

Elizabeth Wilkes, Foundation Fellow, CURO Research Assistant
Julia Connell
Dr. Jennifer Rice, Geography, Franklin College of Arts & Sciences

Hydraulic fracturing (fracking) is largely unregulated at the federal level and is exempt from nearly all federal environmental laws, leaving individual states and localities to regulate the industry. This fragmented landscape of regulatory responsibility has resulted in limited spaces to contest whether or not fracking should be permitted. Our research attempts to determine the spaces and practices of opposition that are possible under neoliberal forms of fracking governance. Using theoretical insights on the nature of democracy, we examine an anti-fracking movement in western North Carolina, one of the only such movements in the United States to coalesce before drilling had started. We argue that contemporary forms of democracy under neoliberalism limit resistance and activism to what we call "micro sites" of contestation. These include: letters to the editors in local newspapers; landowner rights workshops on fracking; local government resolutions against fracking; and the Mining and Energy Commission (MEC) hearing on the rules that permit hydraulic fracturing. This research contributes literature on state theory and environmental governance by showing the ways in which resistance is focused into narrow spaces of dissent under neoliberal governance.

Optogenetic Control of a Neuromuscular Junction Model on a Chip

Elizabeth Wilkins, CURO Honors Scholar
Catherine Callaway
Dr. Steven Stice, Animal & Dairy Science, College of Agricultural & Environmental Sciences

Currently, more than 300,000 people in the United States live with spinal cord injuries (SCIs). Such damage to the central nervous system frequently results in paralysis, impairing a patient's ability to function independently. In one downstream effect of SCI, motor neurons, which control voluntary and involuntary movement, die and fail to properly synapse on muscles at neuromuscular junctions (NMJs). No treatment effectively reverses the damage of an SCI. Pluripotent stem cells (PSCs) are an attractive candidate for post-injury cell replacement therapy because they can differentiate into the three germ layers responsible for forming all adult tissue. Optogenetics, or light control of cells, provides a groundbreaking means to stimulate neurons without electrical or pharmacological agents. Microfluidics devices serve as a high throughput investigative tool to demonstrate the therapeutic potential of PSCs. These apparti provide an optimal setting to mimic three-dimensional microenvironments within the body previously limited to animal model investigations. In this study, we utilized a microfluidic approach to demonstrate

functional optogenetic neuronal control of NMJs. We differentiated a line of PSCs constitutively expressing the optogenetic protein channel rhodopsin-2 (ChR2) into optically excitable motor neurons within a 3D aggregate. We co-cultured these aggregates with muscle strips in the microfluidics device to form NMJs. Our NMJ-on-a-chip will serve as model for cell replacement therapy. The selective activation of specific muscle sets with optogenetic control could be used to retrain an SCI patient to walk again.

Love, Lust, and Loyalty: Female Sexuality in the Auchinleck Romances

Camily Williams
Dr. Cynthia Turner Camp, English, Franklin College of Arts & Sciences

The Auchinleck manuscript, a medieval book produced between 1330 and 1340, is notable for its large collection of romances in Middle English. Many of these stories depict coming of age and the proper socialization of men and women and would have been used to instruct and entertain members of the middle-class household. While the male protagonists serve as models of gendered behavior, the female heroines do not, often seducing or coercing men to have sex. Conduct literature aimed at young women from the same period explicitly condemns these behaviors; however, rather than being punished, the sexually forward romance heroines are rewarded for their actions in the form of greater freedom and power. Because this text likely served instructional purposes, I argue that these misbehaving women offer a different picture of female sexuality that may have been accessible to young laywomen. "Le Fresne" presents a particularly important conversion of these messages since she acts in ways that are both exemplary and non-exemplary by the standards of conduct literature. Comparing these romances to each other in the context of "Le Fresne" reveals a pattern of young women using their sexuality in order to secure their futures. Considering this pattern in conjunction with more conservative conduct literature exposes conflicting messages about female sexuality. These differences are important because they provide insight into the alternate messages young women may have received about their sexuality and their power.

New Challenges: ADHD Goes to College

Sarah Williams, CURO Research Assistant
Dr. James Coverdill, Sociology, Franklin College of Arts & Sciences

Problem Statement: This research explores the experiences and challenges of those who are first diagnosed with ADHD in college. Many studies have explored childhood ADHD; few have considered college ADHD. *Methods:* Fifteen University of Georgia students aged 18-25 (10 women and 5 men) were recruited through social media and interviewed face-to-face. Semi-structured interviews presented a common core of questions followed by prompts for elaboration. Questions fell into three categories: circumstances surrounding the diagnosis; treatment approaches; and ADHD experiences. All interviews were recorded with permission and transcribed verbatim. Analysis involved multiple readings of the interviews to identify main themes. *Findings:* Four main themes emerged in the interviews. First, the circumstances prompting a diagnosis often included substantially lower grades in college relative to high school. Second, symptoms were often experienced and recognized prior to college, but were not acted upon because they did not substantially interfere with academic or social activities. Third, upon coming to college, students felt inadequate compared to peers in study habits, social capabilities, and academic outcomes. Fourth, participants felt that widespread informal use of ADHD medication and the belief that ADHD is a "childhood disease" were stigmatizing. All findings are presented via representative quotations from the

interviews. *Significance:* The results begin to fill a research void by suggesting that the experiences and challenges of those diagnosed with ADHD in college differ from those for children. By understanding the unique challenges that accompany a college-age diagnosis, physicians can better prepare and counsel patients.

Comparison of Oconee and Ocmulgee River Basins for Water Management Improvement

Joshua Willis, CURO Research Assistant
Dr. Ernest Tollner, College of Engineering

With increasing population in Georgia, water demand and wastewater generation are dramatically increasing. This requires refining water management strategies in order to meet future demands and support economic development of the region. The Oconee and Ocmulgee Rivers are adjacent basins and major tributaries that join to form the Altamaha River. Our study examines the ecological effects of alternative water management practices in both the Oconee and Ocmulgee river basins. These rivers harbor high aquatic biodiversity, and protecting these species is of high priority for the region. Thus, we simulate alternative environmental flow regimes and examine trade-offs in water management between ecological impacts and economic development. We simulate unaltered and altered flow regimes using historical streamflow discharge data, which are then examined relative to local hydraulic conditions and aquatic habitat needs. In order to model hydraulics of the river, we use the Hydrologic Engineering Center's River Analysis System (HEC-RAS) developed by the US Army Corps of Engineers. We also use the Hydrologic Engineering Center's Ecosystem Function Model (HEC-EFM) to link hydrologic management with ecological outcomes using fish Habitat Suitability Index (HSI) models. We analyze and evaluate various flow regimes and their environmental impact in order to provide insights into hydrologic similarities and differences when comparing the two river basins. This type of study informs development of environmental flow regulations in the Oconee and Ocmulgee river basins and contributes to the improvement of local water management and planning.

Learning beyond the Lines

Kalyn Wilson, CURO Research Assistant
Dr. Cheryl Hollifield, Grady College of Journalism & Mass Communication

In 2014, a series of police shootings of African American citizens led to widespread civil unrest across the U.S. Research shows that there is a large and continuing gap between the perceptions of Black and White Americans on racial issues in America, and the differences are largest on questions of racism among police and in the justice system (Gallup, 2014). After the racial upheaval of the late 1960s, the Kerner Commission (1968) found that a significant factor in those events was the lack of diversity in U.S. newsrooms, which caused the media to ignore issues important to African American citizens. This study asks what factors in journalism education help prepare 21st century journalism students to understand and cover sensitive issues, including racial issues in society, and what impact a university's environment has on journalism students' career outlooks. The study uses a comparative survey design. The population is journalism majors at the University of Georgia and at Albany State University, an HBCU. The study uses a census of journalism majors in both universities. The researcher hypothesizes that both African American and non-African American journalism students attending the HBCU will be more aware of issues of discrimination because of race, religion and other demographic factors than will journalism students in a non-HBCU,

regardless of the respondent's race. The findings from this project may provide information that will enhance our ability to more effectively prepare journalists to handle socially important, yet sensitive topics in the field.

Copy-Cats: Aphra Behn's *The History of the Nun* and Its Adaptations

Sydney Wilson
Dr. Elizabeth Kraft, English, Franklin College of Arts & Sciences

In this paper, I examine Aphra Behn's *The History of the* Nun and the key changes made in each of Thomas Southerne and David Garrick's dramatic adaptations and analyze possible reasons for the popularity of Isabella's tale in each adaptation's political and socioeconomic time periods. I argue that the reason for Isabella's descent into desperate murder stems from concerns about legitimacy, the conflict of two inheritances during the Succession Crisis, and William of Orange and King George III's reigns as monarch in each successive version of the tale. I also argue that these adaptations' use of children and murder significantly transform the costs and benefits of Isabella's choices, put a knife in her hands, and increase her risk of being caught. Furthermore, I hypothesize that Behn's original story may have itself been an adaptation, drawing inspiration from the French tale of Martin Guerre, a legal case involving a peasant masquerading as war widow's husband back from the dead. In using Isabella as the anti-heroine, Behn, Southerne, and Garrick transform a story of a female victim into one of empowerment, even if Isabella's tale never quite ends well for her. In conclusion, this project, by closely examining one of Behn's less popular works and its adaptations, sheds light on the era's obsession with women and its inability to decide what should be done with a woman who manipulates her own fate both legally, emotionally, and most shockingly of all, with a simple needle or knife.

Theoretical Investigation of the Combustion Chemistry of Acetaldehyde and Ethenol

Alexander Winkles, CURO Research Assistant
Prof. Henry Schaefer, Chemistry, Franklin College of Arts & Sciences

For butanol to be considered a viable fuel source, an understanding of its combustion chemistry is imperative. Incomplete combustion of butanol produces ethenol and acetaldehyde, a known pollutant, which were studied using ab initio techniques at a high level of theory. The focal-point analysis method was utilized to examine hydrogen abstractions of both ethenol and acetaldehyde. Ground electronic state geometries for each species and their radicals were optimized using the "NASA Ames" atomic natural orbital (ANO) basis sets and coupled-cluster theory up to perturbative triple excitations [CCSD(T)/ANO2]. Single-point energies were extrapolated to the complete basis set limit using Dunning's correlation-consistent basis sets and coupled-cluster theory up to full triples with perturbative quadruple excitations [CCSDT(Q)]. Additional corrections for relativistic effects, the Born-Oppenheimer approximation, frozen core approximation, and zero-point vibrational energies were determined. Anharmonic frequencies were obtained at the CCSD(T)/ANO1 level of theory. Our findings will be available to the chemical community to aid in the construction of a more complete combustion model of butanol as well as to identify spectroscopically the molecules in question.

Soldiers of Fortune: The Incidence of Mercenary Usage in Civil Conflict

Rebekah Worick
Dr. Sara Kutchesfahani, International Affairs, School of Public & International Affairs

Mercenaries, soldiers who fight for profit rather than patriotism, are as old as warfare itself. Contrary to international norms discouraging their use, however, mercenary forces still remain the most efficient and reliable source of combat personnel in many civil conflicts. Oftentimes, though, countries engaged in similar states of civil war may vary drastically in their levels of mercenary participation, with some countries dependent upon mercenaries and others avoiding their use entirely. Thus, this research will seek to explain the reasons for uneven incidence of mercenaries in civil conflict by examining two case studies, Algeria and Sierra Leone. Both of these countries experienced civil wars during the same ten year period (1992-2002), but while Algeria abstained from recruitment of mercenaries, Sierra Leone utilized mercenaries heavily. To explain this phenomenon of civil warfare, this research compared potential sources of economic divergence between the two case studies, eventually concluding that the presence of alluvial diamonds in Sierra Leone contributed to the asymmetrical recruitment of mercenaries. This argument was validated by comparing mercenary recruitment rates between countries with and without alluvial diamond deposits. Countries with alluvial diamond deposits were indeed more likely to recruit mercenaries during civil conflict, with a rate of 75% mercenary participation, as opposed to the global average of 36.8% in countries without alluvial diamonds. The conclusions of this research are therefore important in predicting which countries are more susceptible to mercenary involvement, and as such, these findings will help further understanding of mercenary incidence in wartime as a whole.

Divergent Selection in the Context of Source-Sink Dynamics

James Workman, CURO Graduation Distinction, CURO Research Assistant
Dr. Jill Anderson, Genetics, Franklin College of Arts & Sciences

Environmental conditions vary through time and across space, exposing natural populations to different abiotic and biotic regimes. In turn, divergent selection can favor specialization to contrasting environments, leading to the evolution of local adaptation. *Vaccinium elliotti,* a native species of blueberry, grows in two different habitats in the southeastern United States: drought-prone upland forests and flood-prone bottomland forests. Upland forests have dry nutrient-poor sandy soils, high light penetration into the understory, and increased susceptibility to drought. In contrast, bottomland forests that flood 1-2 times annually have nutrient-rich clay soils and dark understories. We hypothesized that natural selection in upland forests would favor traits that promote fitness under drought, including deep roots and high root: shoot ratios. In contrast, we expected selection to favor different trait values that promote flood tolerance in wetland populations. These particular populations of *Vaccinium elliotti* present an interesting case study because this species shows evidence of source-sink dynamics, with higher fitness in upland forests and asymmetric gene flow from upland into bottomland populations. In a source-sink demographic system, there is variation in habitat quality among patches. Gene flow from the source habitat allows the population in the sink to persist, despite less favorable conditions. This asymmetric gene flow could inhibit rates of divergence between the two populations, reducing the potential for bottomland (sink) populations to adapt to local conditions. To investigate patterns of selection in *Vaccinium elliotti* we conducted a greenhouse experiment simulating one of the primary ecological differences between the bottomland and upland habitats: long term flooding and drought. We found evidence for divergent selection favoring opposing trait values under different water stress treatments for several ecologically relevant traits. These findings suggest that local adaptation is possible even in populations experiencing

asymmetric gene flow from habitats with different selection pressures.

Wedding Apparel: A New Definition
Taylor Wright
Dr. Katalin Medvedev, Textiles, Merchandising & Interiors, College of Family & Consumer Sciences

The legalization of same sex marriage directly impacts the wedding industry, specifically the cultural definition of what constitutes wedding apparel. Because the legal definition of marriage has recently changed, the traditional definition of wedding apparel is likely to change as well. Historically, wedding apparel has been reflecting traditional gender roles and accepted social norms. However, with the recent legislation, it has also become an important tool of self-identification within the LGBT community. While masculinity and femininity have become more fluid categories, this fact is not reflected in the sartorial options provided by the conventional wedding industry. To understand the issues at stake, I have conducted field research, analyzed blogs and scrutinized future trend reports. Based on the data I have collected, I hypothesize that there will be a significant change in the near future in terms of what is available for same-sex wedding apparel. My research has shown that while there is a considerable demand for alternative wedding apparel, the offering in the actual stores in the Atlanta area remains limited. Although the issue of gay marriage remains controversial, the discrepancy between supply and demand is still puzzling from a business perspective, considering that support for gay marriage among citizens has increased from 35% in 2001 to 55% in 2015. This major and rapid shift in social opinion will directly impact the apparel industry, which tries to stay ahead of popular social movements in order to make a profit. As a result of the legalization of gay marriage, the wedding market is growing and with it the definition of wedding apparel is also changing.

Severity of Cases Admitted into a Small Animal Hospital and the Phase of the Moon
Alyssa Wuellner, CURO Graduation Distinction, CURO Research Assistant
Dr. Erik Hofmeister, Small Animal Medicine & Surgery, College of Veterinary Medicine

A correlation between the phase of the moon and human/animal behavior has a long tradition. Previous studies have suggested an increase in the number of cases seen or admitted into small animal hospitals during a full moon. In contrast, other studies have shown no significant effect of the full moon. All previous studies have looked only at numbers of cases, not severity of cases. The purpose of this study was to determine if the severity of the cases admitted into a small animal hospital is associated with the phase of the full moon. All data were obtained from the University of Georgia Veterinary Teaching Hospital. Cases were admitted to the hospital between 2009 and 2014. A full moon was defined as the date of the actual full moon plus and minus one day. Variables collected included cost of treatment and duration of stay in the hospital. A total of 82,455 cases were analyzed with approximately 9,935 being on full moon dates. The cost of treatment was 17.9% higher on dates of the full moon versus dates of non-full moons ($p=0.21$), and the duration of hospitalization was 19.7% ($p=0.48$) higher on dates of the full moon versus dates of non-full moons. 100 cases were randomly chosen and are being classified as mild, moderate, or severe illness to compare with duration and cost of hospitalization to establish the utility of those measures as proxies for disease severity.

Prevalence of Pain in Dogs with Cancer
Alyssa Wuellner, CURO Graduation Distinction, CURO Research Assistant

Kayla Hargrove
Dr. Erik Hofmeister, Small Animal Medicine & Surgery, College of Veterinary Medicine

Pain affects 52-77 % of people affected by cancer. The incidence of pain in dogs with cancer is unknown. The purpose of this study was to determine the prevalence of pain in dogs with cancer. We hypothesized that, like humans, dogs experience high rates of clinically significant pain associated with cancer. Dogs presented to the University of Georgia Veterinary Teaching Hospital's oncology service were considered for inclusion. Dogs with interfering medical conditions and those who posed potential risk to the safety of evaluators were excluded. Client consent was obtained for each participant, in addition to a survey assessing their dog's appetite, temperament, activity level, and level of pain they appeared to be experiencing. Each dog was evaluated by one of two undergraduate researchers under the supervision of oncology staff. A physical exam was performed by one of the two evaluators, and patients were given a pain score rating from 0 to 5. Out of 50 patients currently in the study, 61% had a pain score of none, 18% scored mild, and 21% scored moderately. Based on these results, dogs have a lower prevalence of pain compared to that reported in humans.

Heritability of Tissue Glutathione Levels and Redox Status in Aged Mice

Claire Yakaitis, CURO Research Assistant
Dr. Robert Pazdro, Foods & Nutrition, College of Family & Consumer Sciences

The ubiquitous tripeptide glutathione (GSH) is a critical regulator of the cellular antioxidant defense system, and higher levels are associated with protection against disease-related deterioration. The ratio of GSH to its oxidized form, GSSG, also serves as an informative indicator of oxidative stress. We previously discovered that tissue GSH levels and GSH/GSSG are highly heritable in young mice, but it is unclear whether the genetic control of the GSH system changes over time. We predict that GSH heritability decreases later in life. To test this hypothesis, we employed high performance liquid chromatography (HPLC) to quantify GSH concentrations and GSH/GSSG in the kidneys, liver, pancreas, heart, striatum, and cerebral cortex obtained from a panel of genetically diverse inbred mouse strains. We calculated heritability of GSH levels and GSH/GSSG in the various disease-relevant tissues. The current study is the first to characterize the heritability of GSH in aged mammals. Our results will inform future studies of aging and its influence on redox dysfunction.

Blood Folate and Whole Blood Global DNA Methylation Response to Folic Acid Supplementation Dose during Pregnancy

Joann Yang, CURO Research Assistant
Dr. Hea-Jin Park, Foods & Nutrition, College of Family & Consumer Sciences

Folate is a water-soluble vitamin that is essential for DNA synthesis and epigenetic regulation. Pregnant women are recommended to take 400μg of folic acid (FA) daily for normal fetal development and most over-the counter prenatal vitamins contain 800μg of FA. In this double-blind randomized controlled study, we aimed to determine the effect of FA supplementation dose during gestation on folate status and global methylation in maternal and cord blood. Healthy young pregnant women were provided with 400μg FA/d (RFA; n=16) or 800μg FA/d (HFA; n=12) from their first prenatal visit (<12-weeks gestation) until delivery. Maternal blood at baseline and delivery and cord blood at delivery were collected to measure serum folate, RBC folate (microbiological assay) and global methylation (LC-MS/MS). At delivery, serum and RBC folate concentrations tended to be higher in

HFA compared to RFA in maternal (serum folate (nmol/L); 78.0±7.5 vs 67.9±6.1, RBC folate (nmol/L); 2424.0±304.6 vs. 2046.0±196.8 in HFA and RFA, respectively) and cord blood (serum folate (nmol/L); 98.5±5.1 vs 81.7±7.5, RBC folate (nmol/L); 2097.0±140.4 vs. 1691.0±155.1 in HFA and RFA, respectively), were not significantly different between groups ($p>0.05$). Interestingly, global methylation was higher in RFA than that in HFA in maternal and cord blood. Maternal serum ($p=0.036$, $r=0.285$) and RBC folate concentrations ($p=0.004$, $r=0.389$) correlated with global methylation, while folate status of cord blood was not correlated with global methylation. These data suggest that folate status may be associated with global DNA methylation status in pregnant women, but not in cord blood.

Cognition in the Crosshairs

Jacob Young, CURO Summer Fellow, CURO Graduation Distinction, CURO Research Assistant
Dr. Michelle vanDellen, Psychology, Franklin College of Arts & Sciences

Many studies have been conducted on how weapons affect cognition. However, these effects have been studied in pockets of research, most notably in research on the Weapons Effect, the Weapon Focus Effect and the Race-Weapon Effect. This meta-analysis seeks to integrate this literature to examine the overall effect of weapons priming on cognition. With 67 samples contributing effect sizes, the meta-analysis finds that, relative to mundane objects, weapons attract attention and draw attention away from weapon-holders (or object-holders) and surroundings. People also recall more incorrect information when a weapon present but do not demonstrate a corresponding drop in confidence.

Poverty and Shame: Implications for Social Work

Theresa Young, CURO Research Assistant
Dr. Mary Caplan, School of Social Work

Poverty and shame are interwoven in a complex relationship that is time and place-specific, and can be considered as a co-constructed and mutually-reinforcing social and psychological phenomenon (Walker 2014). The experience of shame among people experiencing poverty is nearly universal (Chase and Bantebya-Kyomuhendo 2015), but is largely unrecognized by the general population, as well as by the practitioners working within that population. It is critical for human service professionals to have a working knowledge about the relationship of poverty and shame in order to best aid those experiencing poverty with appropriate demonstrations of empathy and provision of resources. The foundation for understanding poverty and shame has been laid in the work of Adam Smith (1776) and Amartya Sen (1999). This presentation provides results from a research study on the psychosocial results of poverty and shame. The authors employ a method known as a "scoping review" to answer the following question, "What is known about the relationship between poverty and shame?" A scoping review is similar to a systematic review in that it is a transparent, rigorous review of the literature, and uses systematic searching and evaluation criteria within multiple databases to produce findings that are useful for practitioners and policy makers (Arksey and O'Malley 2005). Unlike a systematic review, a scoping review analyzes variety of types of research, including quantitative, qualitative, and conceptual work. The results of this review will enable participants to understand the relationship between poverty and shame more deeply. From our findings, awareness will be raised regarding the external and situational causes of shame and the practice implementations for human service professionals.

Index

Index

D

E

Index

Index

Index

Index

T

U

Index

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203 Moore College
University of Georgia
Athens, GA 30602
706-542-5871

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Table of Contents

UNIVERSITY OF GEORGIA
Center for Undergraduate Research Opportunities

April 3, 2017

Dear Students, Faculty, and Guests,

Welcome to the 17th annual CURO Symposium, UGA's celebration of undergraduate research across the disciplines. Many individuals—administrators, faculty members, staff, graduate students, and, of course, undergraduate students—have collaborated to make the CURO Symposium the premier undergraduate academic event at UGA.

Each year, the Symposium has grown larger, and the 2017 Symposium is the largest to date, with 550 undergraduate researchers communicating their substantial accomplishments to their peers, mentors, and the public at large.

From its inception, the CURO Symposium has showcased research and scholarship in all disciplines. The 2017 Symposium continues that commitment, featuring presenters pursuing 91 different majors from 13 schools and colleges who are conducting research with 311 faculty members from 72 departments. Thus, this two-day event displays UGA's broad and substantial support of research and the invaluable commitment of UGA's administration and faculty to mentoring and providing exceptional learning opportunities for our undergraduates.

Thank you for your continued support of undergraduate research and CURO.

Sincerely,

Dr. David S. Williams, '79, '82
Associate Provost and Director

Dr. Martin P. Rogers, '01, '11
Associate Director

Acknowledgements

Special Assistance for 2017 CURO Symposium

Mr. Ryan Kelly	Administrative Associate, External Affairs, Honors
Ms. Dorothé Otemann	Coordinator of External Affairs, Honors
Ms. Amanda Pruitt	Assistant to the Director, Honors
Ms. Karen Newcomb	IT Professional, Honors

Technology Equipment & Support for 2017 CURO Symposium

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Odum School of Ecology	Franklin College of Arts & Sciences
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Dr. David S Williams	Associate Provost and Director of Honors & CURO

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Mr. Keenan Stone	Department of Physics & Astronomy

Schedule

Monday, April 3, 2017

Oral Session I **11:15 a.m.-12:05 p.m.**
Athena Breakout Rooms A, B, C, D, G, H, I, J

Oral Session II **12:20-1:10 p.m.**
Athena Breakout Rooms A, B, C, D, G, H, I, J

Oral Session III **1:25-2:15 p.m.**
Athena Breakout Rooms A, B, C, D, G, H, I, J

Oral Session IV **2:30-3:20 p.m.**
Athena Breakout Rooms A, B, C, D, G, H, I, J

Awards and Keynote Session **3:30-4:30 p.m.**
Athena Room E

Poster Session and Reception **4:30-6:30 p.m.**
Grand Hall South (downstairs – use escalator in lobby)

Tuesday, April 4, 2017

Oral Session V **9:30-10:45 a.m.**
Athena Breakout Rooms A, B, C, D, G, H

Oral Session VI **11:00 a.m.-12:15 p.m.**
Athena Breakout Rooms A, B, C, D, G

Oral Session VII **12:30-1:45 p.m.**
Athena Breakout Rooms A, B, C, D, G, H, I, J

Oral Session VIII **2:00-3:15 p.m.**
Athena Breakout Rooms A, B, C, D, G

Oral Session IX **3:30-4:45 p.m.**
Athena Breakout Rooms A, B, C, D, G, H, I, J

CURO Research Mentoring Awards

The Office of the Senior Vice President for Academic Affairs and Provost and the Honors Program established the CURO Research Mentoring Awards, formerly the EURM awards, in 2001.

These awards recognize outstanding faculty who consistently engage undergraduate researchers through CURO Programming (courses, the symposium, summer fellows, JURO, theses, et al.) and enhance the learning experience of undergraduate researchers at the University of Georgia. Award recipients have provided superior research opportunities and mentoring and have collaborated with undergraduate researchers on publications and presentations at professional conferences.

Before 2014, awards were designated as "Early Career" and "Master Level" and were granted to corresponding faculty ranks.

2017

Dr. Kevin McCully, Professor of Kinesiology, Director of the Exercise Muscle Physiology Laboratory, College of Education

Dr. Brenda Cude, Professor, Financial Planning, Housing and Consumer Economics, College of Family and Consumer Sciences

2016

Dr. Mable Fok, Assistant Professor, Electrical and Electronics Engineering, College of Engineering

Dr. Richard Lewis, R.D., Foods and Nutrition, UGA Foundation Professor in Family and Consumer Sciences

2015

Dr. Jeb Byers, Professor, Odum School of Ecology

Dr. Erik Hofmeister, DVM, DACVAA, DECVAA, MA (Anesthesia), Associate Professor of Anesthesiology, Chief of Small Animal Surgery and Anesthesia, College of Veterinary Medicine

2014

Dr. Carl Bergmann, Associate Vice President for Research-Facilities; Associate Director, Complex Carbohydrate Research Center; Executive Director, Animal Health Research Center; Senior Research Scientist

Dr. Andrew Owsiak, International Affairs, School of Public & International Affairs

2013

Master Level Faculty Award
Dr. Jennifer McDowell, Psychology, Franklin College of Arts & Sciences

Early Career Faculty Award
Dr. Katalin Medvedev, Textiles, Merchandising & Interiors, College of Family & Consumer Sciences

To view a complete list of recipients, visit: curo.uga.edu/faculty/research_mentoring_awards.html

CURO Symposium Best Paper Awards

Since 2001, CURO Symposium Best Paper Awards have recognized excellence in papers developed from work being presented at that year's Symposium.

Applicants may submit in one or more of the following categories: Arts, Humanities and Media; Business; Life Sciences; Physical and Environmental Sciences; Public and International Affairs; Social Sciences; and Technology, Engineering and Math.

Each recipient is recognized at the Symposium's Award and Keynote Session, and each award carries $100 in financial support. Winners for the 2017 CURO Symposium are listed below.

Arts, Humanities and Media:

Anna Jewell Davidson	Privileged Perception: An Examination of Supersensory Insight in Vladimir Nabokov's *The Gift*

Life Sciences:

Atul Lodh	Investigating the Role of Cyanogenic Glycosides as a Potential Defense for *Passiflora incarnata* against *Agraulis vanillae*

Public and International Affairs:

Hannah Catherine Turner	The Price We Pay: Analyzing the Over-Incarceration of Low-Level Juvenile Offenders in Georgia

Social Sciences:

Paul DuPont Oshinski	Women's Rights from 1985-2013: Using Gendered Theories to Explain Countries' Development

Technology, Engineering and Math:

Vineet Sundar Raman	Tablet-Based Data Collection for Leprosy Surveys

Program: Monday, April 3, 2017

Oral Session I: 11:15 a.m.-12:05 p.m.

Athena Breakout Rooms A, B, C, D, G, H, I, J

Room A	**McKenna Barney**	Nutrition of Women and Adolescent Girls in Conflict Zones
	Jonathan Zot Sr.	Olympic Performance and Propensity for Interstate Conflict
	Ali Elizabeth Anderson	Chemical Weapons and the Legacy of War
Room B	**Maggie Naughton**	Examining Stigma and Social Functioning in Young Adults with Autism
	Evan Simone Johnson	How Do Parental Practices Influence Adolescent Food Choices?
	Sara Carroll Johnson, Amber Madden	Mothers' Childhood Emotional Neglect as a Predictor of Child Behavior Problems
Room C	**Chelsea Thorpe**	*Charlie Hebdo*: Moral Injury and the Display of Religion in Satirical Press
	Mohammed Khalifa Kredan	Understanding American and Cuban Perceptions of Migration to America
	Izzy Ceron	"Immigrants, We Get the Job Done!": Depictions of the U.S. Immigrant Experience on Broadway
Room D	**Emily Elizabeth Gale**	White Matter Integrity Decreases Similarly with Age between People with Schizophrenia and Healthy Individuals with Low Cognitive Control
	Evan Knox	Mild Traumatic Brain Injury (mTBI) Moderates Protection of Cognitive Flexibility by Cognitive Reserve
	Haley Cohen	Risk Factors for Social Isolation in Elder Care Recipients
Room G	**Jianna Justice**	Examining the Entropic: Locating Modernity in the Writings of Jane Austen
	Sarah Jane Dillon	*Tolak Reklamasi*: Rejecting Tourist Developments in Bali
	Nina Goodall	Concrete Art and Fascism in Argentina in the 1940s

Room H	**Chip Chambers**	The Role of Non-Cas Proteins in the Adaptation Stage of CRISPR-Cas in *Pyrococcus furiosus*
	Aaron Martinez	Decoding Higher-Order Relations in Biological Data by Learning Markov Networks
	Tae-In Lee	Off-Target Effects of the Inhibitor MRS2578 on the Formation of Neutrophil Extracellular Traps
Room I	**Katie Howard**	Genetic Determinants of Intracellular Survival and Growth of *Bordetella pertussis*
	Santosh Nimkar	Facilitating the Continuous Expression and Secretion of the Influenza Surface Glycoprotein, Hemagglutinin, within Human Cells
	Hannah Kemelmakher	Functional Evaluation of Porcine Kidney: A Thorough PSF Organ Storage Study
Room J	**Emily Maloney**	Effect of Polarization on Hierarchies of Committee-Representative Networks: Social Network Analysis
	Stephen Benjamin Jordan	Mapping Near Misses in Athens-Clarke County
	Taylor Withrow	The Ugly Duckling Narrative: Identity Development in Multiracial Individuals

Oral Session II: 12:20-1:10 p.m.
Athena Breakout Rooms A, B, C, D, G, H, I, J

Room A	**Bryson Culver**	Judicial Politics in the Obama Era
	Emil Dmello	An Empirical Analysis of Economic Influence on Election Outcomes
	Brad Louis Williamson	The Effectiveness of US Congressional Committees
Room B	**Sydney-Alyce Bourget**	A Comparison of Functional and Fitness Traits of *Alliaria petiolata* along a Forest Gradient
	Mallory Jessica Harris	Vector-Borne Disease Forecasting

	Raheela Charania	Compiling Studies on Pedagogical Content Knowledge within Topics of Evolution
Room C	**Amanda Molly Joffe**	Bent and Broken: Debating China Beyond the Great Firewall
	Cameron Ward Henderson	Fifty Years In: Just Warming Up : How the Nuclear Nonproliferation Treaty Can Effectively Combat Global Warming
	Chelsea Thorpe	How Does Resource Availability Affect Non-State Armed Group Recruitment?
Room D	**Bryanna Moppins**	Development of a Novel Three-Dimensional Model to Study Breast Cancer Metastasis
	Miranda Moore	Effect of Heliox through Airflow and Aerosol Deposition in Oral Airway
	Carter Fitzgerald	Techno-Economic Assessment of Anaerobic Digestion Technology to Produce bioCNG
Room G	**Julia Marie Petros, Chantal Van Landeghem**	Parental Support for Autonomy as a Predictor of Anxious and Depressed Behaviors in Elementary School Children
	Joshua Reynolds	Neuroanatomical Correlates of Functional Decline during Normal Aging
	Zoe Schneider	Investigation of Visual Event Related Potentials in Schizophrenia, Schizoaffective, Psychotic and Non-Psychotic Bipolar Disorders
Room H	**Kathryn Marie Youngblood**	Pedagogical Methods for Developing Empathy in Engineering Students
	Briel Power	An Investigation into the Dynamics of Faculty Learning Communities
	Carter Patrick Maguire III	The Effect of ePortfolio Use on Real-World Application of Classroom Skills
Room I	**Katie Maddox**	Effect of Invasive Macroalgae *Gracilaria vermiculophylla* on Feeding Behavior of *Callinectes sapidus*
	Eric Dykes	Characterization of a V-H+-ATPase in *Toxoplasma gondii*

	Alexandria Lushaj	Forensically Influential Beetle Fauna in the Fall of 2016
Room J	**Nanma Okeani**	Justice for All: Addressing Codified Discrimination in the Georgia Justice System
	Sam Tingle, Stephen Jordan	Mapping Diverse Bicycling Experiences in Athens, GA
	Zac Commanday, Brian Northern	Resiliency and Sustainable Organizations: Leveraging Weather Management Systems

Oral Session III: 1:25-2:15 p.m.
Athena Breakout Rooms A, B, C, D, G, H, I, J

Room A	**Ellen Grace Krall**	Characterizing Ty1 Gag - CCT Complex Interactions in Budding Yeast Through Co-Immunoprecipitation and Mass Spectrometry
	Erin Hollander	Protospacer Structure and Cas Protein Function in Adaptation of the *Streptococcus Thermophilus* Type II-A CRISPR-Cas System
	Nikita Vantsev	Adapting a CRISPR-Cas System into a Novel Gene Knockdown Platform
Room B	**Adam Salway**	An African American Oral History: Historic and Contemporary Experiences of Gentrification in the Hancock Corridor
	Chloe Schrader	Intersectional Failure: The Effect of Zero-Tolerance Policy on Girls of Color
	Genesis Castro	Latino Resilience Among Undocumented Families
Room C	**Stephanie Ann Jaipaul**	The Prevalence of Science Misconceptions among the Human Body Systems: Understanding, Targeting, and Applying Misconception Findings to Effectively Teach Students about Diabetes
	Eli Chlan	Autonomy and Health Literacy Relationships as a Link to Patient and Provider Satisfaction
	Catriona Geddes	Determining Fidelity of the Physical Activity and Learning (PAL) Program

Room D	**Jessica Ziling Ho**	Genotype-Phenotype Correlations for POMGNT1 and POMGNT2 in Dystroglycanopathies
	Catherine Waldron	Exploiting CRISPR/Cas Genome Editing System in Ciliogenesis
	Sunishka Thakur	Studying Gene Flow in *Boechera stricta* to Understand the Impacts of Climate Change
Room G	**Maria Granros**	Performance on a Measure of Multitasking is Related to Executive Function in Older Adults
	Jane Sutcliff	Cognitive Control Differences in Bipolar Disorder in the Presence or Absence of Psychosis
	Megan Murphy	The Effect of Aerobic Exercise on White Matter in Overweight Children: Studying the Effect of an 8-Month Exercise Program
Room H	**Rachel Collier**	Determining Water Usage of Lettuce under a Sodium Light Source for Indoor Agriculture
	Sokngim Kim	A Computer Program for Truss Design Optimization
	Adam King, Dustin Mizelle, Anurag Banerjee	Research and Development of Satellite Software and Electronics
Room I	**Jessica Lauren Reynolds**	Assessment of Spatial Distributions of Sea Turtle Nests In Relation to Artificial Lighting in St. Kitts, West Indies
	Jenna Kay Lea	Determining Reoccurring Tick and Tick-Borne Disease Associations with Mammal Hosts
	Lauren A Purvis	Effects of Form and Level of Vitamin E Supplementation on Kinematic and Physiological Measures of Muscle Damage Following Intense Exercise in Horses
Room J	**Anna Magdalena Goebel**	Goethe's Discovery of the Divine in Nature
	Lukas Woodyard	*Indecent*: The Show That Shut Down on Opening Night
	Abigail Elizabeth West	The Sapelo Island Coloring Book

Program: Monday, April 3, 2017

Oral Session IV: 2:30-3:20 p.m.
Athena Breakout Rooms A, B, C, D, G, H, I, J

Room A	**Nivedha Balaji**	Chondroitin Sulfate Glycosaminoglycan Matrices Promote Neuroprotection Sub-Acutely Post-Traumatic Brain Injury
	Kirsten Allen	Development of Polymer-Based Microspheres for Drug and Supplement Delivery
	Emily Nieves	Examining the Arrhythmogenicity of Dobutamine When Used in Conjunction with Isoflurane or Sevoflurane
Room B	**Jacob Beckham**	Two-Point Threshold as a Measure of Hyperacuity and Intraocular Scatter
	Sarah Caesar	The Relationship between Nutrition Status and IADLs in Community-Dwelling Older Adults
	Emily Stewart Moore	The Effect of Galanin on Stress Resilience in Rats and the Relationship between Stress and Inflammation
Room C	**Avni Ahuja**	Sex-Trafficking in Georgia: Equipping Our Hotel Workers with the Proper Resources
	Ashley Willard	Online Activism: The Movement to Combat Honor-Based Violence
	Eashaa Velamuri	Reducing and Preventing Sexual Assaults on Georgia College Campuses
Room D	**Shelbi Aldrich**	Textiles and Fibers Single Point of Contact (SPOC)
	Madeline Grace Harpham	Dior to Disco: Second Wave Feminism and Fashion
	Oloni Binns	Motown Styles and the 1960's American Dream
Room G	**Paul Lee**	The Effect of Lutein and Zeaxanthin Supplementation on Emotional Well-Being
	Shivani Singh	Fatigue, Executive Functioning, and Activities of Daily Living in Older Adults
	Emma Auger	The Effect of Age on Functional Connectivity of Cognitive Control Networks in People with Schizophrenia

Program: Monday, April 3, 2017

Room H	**Sonam Alka Brahmbhatt**	Exploring the Role of DNA Double-Strand Break Repair Proteins in CRISPR Adaptation
	Zack Flagel	Take Me Out to the Ballgame: A Legal Examination of Spectator Injury Risk at Major League Baseball Games
	Fatima Kamal	The Effects of Two Different High-Fat Diets on Appetite Hormone Levels
Room I	**Urmi Patel**	Substrate Specificity of the Lactoperoxidase/Thiocyanate/Hydrogen Peroxide Cell-Free System to Inactivate Influenza Virus
	Connor Matthew O'Neill	The Effect of Macrocyclic Lactones on the Canine Immune Response towards the Heartworm Parasite *Dirofilaria immitis*
	Jack Owen	Exploring Uncertainty in Models of Mosquito Vector-Borne Disease
Room J	**John Coffin**	Predicting Oyster Larval Recruitment and Growth Using Cheaply Obtained, Remotely Sensed Data
	Diamond Clarke	Cdal-1 Kinase of the Hippo Pathway in *Tetrahymena thermophila*
	Ian E. Van Giesen	Investigating the Grindability of Woodchips at Varying Torrefaction Temperatures

Awards and Keynote Session: 3:30-4:30 p.m.
Athena Room E

Welcome and Introductions	David S. Williams, Associate Provost and Director of Honors and CURO
Remarks	Jere W. Morehead, President
	Pamela Whitten, Senior Vice President for Academic Affairs and Provost
Introduction to Awards	Martin Rogers, Associate Director of CURO and Honors
CURO Research Mentoring Awards	David C. Lee, Vice President for Research
2017 Symposium Best Paper Awards	Rahul Shrivastav, Vice President for Instruction
UGA Libraries' Research Awards	Caroline Barratt, UGA Libraries

Program: Monday, April 3, 2017

Introduction of Keynote Speaker	Ms. Erin Hollander, Class of 2018, Department of Genetics
Keynote Address	Dr. Michael Terns, Distinguished Research Professor and Professor of Biochemistry & Molecular Biology, " CRISPR: From Basic Biology to Genome Editing Revolution "
Closing Comments	David S. Williams

Poster Session and Reception: 4:30-6:30 p.m.
Sponsored by the Office of the President
Grand Hall South

Poster # 1	**Camaria Moné Welch**	Needs Assessment to Assess the Use of a Mobile Food Pantry in the Child Care Setting
Poster # 2	**Madeleine Holden Snidow**	Designing Relevant In Vitro Models of Muscle Metabolism with Inclusion of Energy Expenditure
Poster # 3	**Megan Houston**	Effects of a PUFA-Rich Diet on Coagulation and Inflammation Markers in Healthy Adults
Poster # 4	**Fatima Kamal**	The Effects of Two Different High-Fat Diets on Appetite Hormone Levels
Poster # 5	**Leah Nicole Prine**	Metabolic Responses to Diets of Varying Fatty Acid Saturation
Poster # 6	**Olivia Shealy**	Infant Sleep Duration among White Breastfed and Black Formula Fed Infants at 16 Weeks
Poster # 7	**Savannah Carroll**	Child Disability and Maltreatment: Caregiver Support as a Protective Factor
Poster # 8	**Jordan Srochi**	Mentoring as a Protective Factor of the Association between Child Maltreatment and Substance Use in Adolescence
Poster # 9	**Abby Carden Jones**	Household Production of Health: Cambodian Refugees' Health Strategies in the United States
Poster # 10	**Anna Schramski**	Filipino Immigrant Social Networks and Their Influence on Settlement Experience

Poster # 11	**Amanda Peclat-Begin**	Cambodian Mental Health Therapists' Experience in Clinical Supervision: A Phenomenological Exploration
Poster # 12	**Emily Sands**	Utilizing Cultural Advisors in Marriage and Family Therapy Practice
Poster # 13	**Breana Johnson, MacKenzie McGraw, Anna Marie Fink, Brianna Kelley, Lauren Langan, Meredith Anne Towey, Alexis Pope, Jennifer Smith, Sherry Sayavongsa, Aleah Norton**	Newborn Hearing Screening and Follow-up in the Northeast Health District
Poster # 14	**MacKenzie McGraw, Anna Marie Fink, Brianna Kelley, Lauren Langan, Meredith Anne Towey, Alexis Pope, Jennifer Smith, Sherry Sayavongsa**	An Analysis of Early Vocalization Development from the Natural Environment of Two Young Children with Autism Spectrum Disorder
Poster # 15	**Allison N White**	Effects of Pre-Transition Warnings and Contingency Statements on Compliance to Pre-Transition Demands and Problem Behavior
Poster # 16	**Soundarya Kanthimathinathan**	Microaggression in the Eye of the Beholder: Perceiver Characteristics in the Detection of Microaggressions in the Workplace
Poster # 17	**Joshua Acosta, Erica Medrano, Allie Martin**	The Impacts of Narcissism on Individual Status in Interdependent Teams
Poster # 18	**Alex Moore, Gabrielle Moriah Richie, Carissa Urrea, Diana Enriquez, David Wyrembelski**	Likely Leaders: The Influence of Big Five Personality Traits on Leadership Dynamics

Poster # 19	**Neha Arun Madangarli**	A Correlational Study: The Relationship Between Critical Flicker Fusion Thresholds of Postpartum Women and Infants
Poster # 20	**Skyler Tuholski, Samrina Jamal, Katie Lee, Nidhi Thiruppathi, Abby Thomas**	Effects of Gender and Race on Speed and Accuracy of Facial Recognition
Poster # 21	**Samantha Delaney, Shruti Prathip**	Gender Differences in College Students with ADHD
Poster # 22	**Mary Elizabeth Moody**	Double-Deficit Hypothesis for Dyslexia: A Meta-Analysis
Poster # 23	**Selin Odman**	Attention-Deficit/Hyperactivity Disorder (ADHD) Subtypes: Cross-Informant Agreement and Stability from Childhood to Adulthood
Poster # 24	**Amanda Moeller**	The Language of Leadership: Investigating Speech as a Predictor of Leadership Capacity
Poster # 25	**Luvika Gupta**	Regional Brain Morphometry and Associated Cognitive Functions in Older Adults with Cardiovascular Disease
Poster # 26	**Aparna Kanjhlia**	Altered Neural Activity in the MCLS and NA linked to Alcohol Consumption
Poster # 27	**Sahl Hakim**	Effects of Lutein on Vision and Cognition in Children
Poster # 28	**Amita Joshua**	Attachment Orientation and Career Goal Pursuit: The Effects of Relationship Commitment and Workaholism
Poster # 29	**Dillon Patel**	Implicit Subjectivity Assessment and Guilt-Shame Proneness in Work-Family Conflict, Family-Work Conflict and Workaholism
Poster # 30	**Mitchell Lee**	All Things in Moderation: The Effect of Moderation Messages on Food Perceptions
Poster # 31	**Molly Eleanor Minnen**	Employer Expectations and Experiences of Gratitude

Poster # 32	**Divya Patel, Lindsay Burr, Grant Butschek**	Task Allocation between Established and Impromptu Dyads: A Test of the Transactive Goal Dynamics Theory
Poster # 33	**Arturia T Melson-Silimon**	Trait Activation Theory and Academic Performance: Does Academic Major Moderate the Relationship between Personality and Academic Performance
Poster # 34	**Lauren Ellis Arnold**	Family Functioning and Health-Related Quality of Life in Adolescent and Young Adult Transplant Recipients
Poster # 35	**Haley Bearden**	Psychosocial Functioning and Barriers to Medication Adherence in Adolescents Awaiting Solid Organ Transplants
Poster # 36	**Colleen Keeler**	Environmental Consequences, Psychological Comorbidities, and Tic Symptom Severity in Children with Tourette Syndrome
Poster # 37	**Amy Zhan**	Exploring Grief: Accompanying End of Life Support with Palliative and Bereavement Care
Poster # 38	**Sanjida Jahan Mowla**	Updates on Current Circumscribed Interest Object Categories of Children with ASD and Accuracy of Parent Reports
Poster # 39	**Brendan Harris**	Do Transparent Whiteboards Promote Learning from Online Lectures in STEM?
Poster # 40	**Elizabeth Cara Johnson**	Fostering Productive Beliefs about Failure and Intelligence to Improve Learning in STEM
Poster # 41	**Jamarcus Gregory Mathis**	Perceived Severity of Conditions Related to Obstructive Sleep Apnea among At-Risk College Students: Consequences That May Influence Academic Performance
Poster # 42	**Eliza Ali**	Archetypal Features of the Graphical User Interfaces of Electronic Medical Records and Their Cognitive Burden on Users
Poster # 43	**Prentiss Rachel Autry**	Punitive or Positive: How University Affirmative Consent Policies can be Framed for Maximum Effect
Poster # 44	**David Kobe**	Georgia Social Workers and DACA
Poster # 45	**Anna Bennett**	How Social Media Affects Higher Learning

Poster # 46	**Ellen Barrow**	The Financial Obligations of Owning a Pet
Poster # 47	**Marcus Chatman**	The Personal Touch of Discovering Money Solutions
Poster # 48	**Sarah Landa**	Retirement Planning Behavior and Retirement Plan Participation among Men and Women: An Examination of the Determining Factors
Poster # 49	**Victoria Ayse Yonter**	Educational Disparities between Rural and Urban Schools in the State of Georgia
Poster # 50	**Phillip Jones**	The Suburbanization of Poverty in Metro Atlanta
Poster # 51	**Simran Modi**	Redefining the Boundaries of Healthcare Technology Policy
Poster # 52	**Jonathan Waring**	Identification of Vaccine Misinformation Online
Poster # 53	**Christina Lee**	Interactive Animatronics in Consumer Environments
Poster # 54	**Zoe Li**	Competing Pressures: Tipping the Scales in the Prosecution of Rape and Sexual Violence
Poster # 55	**Samuel Driggers**	A Comparison of the 2014 Scottish Referendum and 2016 European Union Membership Referendum Campaigns
Poster # 56	**Rob Oldham**	Majority Party Factionalism and Gridlock in State Legislatures
Poster # 57	**Paul DuPont Oshinski**	The Rules Change the Game: Delegate Allocation Variations and Presidential Primary Season Length
Poster # 58	**Stephen Robert Pokowitz**	Promotion, Patronage and Merit in the Royal Navy during the Napoleonic Wars
Poster # 59	**Christian Michael Sullivan, Kathryn Kostel**	Evolving Racial Perspectives in Haiti, 1785-1820
Poster # 60	**Halle Brooke Hammond**	Southern Gothic Feminism: The Women of Flannery O'Connor's *Wise Blood* and the Women of the Bible
Poster # 61	**Adwoa Agyepong**	Cemetery Records and the Spanish Flu in Athens, GA

Poster # 62	**Prabhjot K Minhas**	Refugee Health and Migration
Poster # 63	**Kara Pemberton**	Using Syndemics Theory to Examine the Correlation Between Wealth, Disease Knowledge and Zoonotic Diseases in Panama
Poster # 64	**Hannah R Gilbert**	Fecal Composition and Its Relation to Diet
Poster # 65	**Rachel N Horton**	Diachronic Perspectives on Human Diet Variation in Greek, Roman, and Medieval Albania
Poster # 66	**Janae Marie Lunsford**	Investigating Diet and Stress in Medieval Polish Individuals Using the Bone Density Fractionation Method
Poster # 67	**Maria Munoz**	Non-Vocal Sounds in a Group of Western Lowland Gorillas
Poster # 68	**Samantha Keating**	The Evolution of Religion in Africa: A Test of the Big God Hypothesis
Poster # 69	**Rose Parham**	Identity, Cosmology, and Subsistence in Madagascar
Poster # 70	**Matt Pieper**	Animism and Foraging Economies
Poster # 71	**Taylor Alicia Hill**	The Necessity for Ethics in Developing Adaptive Management Strategies for Water Scarcity
Poster # 72	**Matthew Quinn**	Applications to Prolonging Data Collection Efficiency in Stream Channels
Poster # 73	**Tony Moraes**	Clay Mineral Concentration with Depth and Land Use History in the Critical Zone In Calhoun, South Carolina
Poster # 74	**David Forest Richards IV**	Rare Earth Elements Distributions in the Critical Zone: Possible Roles of Pine Versus Hardwood Vegetative Covers
Poster # 75	**Sam Svoboda**	Clay Abyss: Underclays of the Şile Region Critical Zone
Poster # 76	**Zaak Alvin Hinz**	Trilobite Coquina in Siliceous Concretions from the Middle Cambrian Conasauga Formation, Southeastern USA
Poster # 77	**Reid Jordan**	Evaluation of Middle-Miocene Barnacles as High-Resolution Paleoclimate Proxies

Poster # 78	**Evan Alden**	College Students' Beliefs and Perceptions Towards Nature and Campus Sustainability
Poster # 79	**Nirav Ilango**	The Accuracy of SfM-Generated Dense Point Clouds Given Varying Image Quality
Poster # 80	**Hollis Neel**	Implementation of Structure from Motion from a Cube Satellite in Low Earth Orbit
Poster # 81	**James Hugh Roach, Paul Hwang**	Laboratory Operations Support for Small Satellite Research Laboratory
Poster # 82	**Austin Thomas Bryan**	Assessing the Removal of Lead from Water Using Commercially Available Filters
Poster # 83	**Chris W Overbaugh**	From Ancient Artifacts to 3D Printers: Using Modern Engineering Tools to Enhance Our Understanding of Classical Athenian Elections
Poster # 84	**Paige Copenhaver**	Comparing Metallicity Measurements from Optical Spectra of Solar-Type Stars
Poster # 85	**Jessica E Doppel**	The Ratio of Gas to Dust at High Galactic Latitudes
Poster # 86	**Mackenzie Joy**	Turbulence at the Edges of Diffuse Molecular Clouds
Poster # 87	**Amanda Stricklan**	Carbon Monoxide Line Emission from Region of Molecular Cloud MBM 55
Poster # 88	**Josh S White**	Hydroxyl Tracing in Diffuse Molecular Clouds
Poster # 89	**Ryan McArdle**	Primordial Chemical Composition Through the Reionization Period
Poster # 90	**Ryan Pattillo**	Photodissociation of Carbon Monosulfide in Interstellar Environments
Poster # 91	**Jason Terry**	The Contribution of Double Electron Capture Processes to Charge Exchange with Multielectron Targets
Poster # 92	**Clark Goodman Veazey**	Computational Investigations of He-HD Collisions in the Interstellar Medium
Poster # 93	**Bjorn Leicher**	A Study of Interstellar Intermediate Velocity Gas Clouds

Poster # 94	**Elliott Williams**	Small Structures in the Magellanic Stream: Cloud-Cloud Interactions
Poster # 95	**Peter Hong, Michael Anthony Piseno**	Multi-Rotor Marsupial Drone System for Point Cloud Data Processing
Poster # 96	**Jenna Evelynn Al-saleh**	Studying Breast Cancer Metastasis to Bone Using Tissue Engineering
Poster # 97	**Kerri Andre**	Controlled Linoleic Acid Release in a Hydrogel-Based Mammary Adipose Tissue Model
Poster # 98	**Ridge Maxson**	Bioactive Scaffold Design for Bone Tissue Engineering
Poster # 99	**Jeremy Miller**	Self-Assembled Chitosan Nanoparticles for Breast Cancer Therapy
Poster # 100	**Chase Tenewitz**	Ferrohydrodynamic Separation of Prostate Circulating Tumor Cells
Poster # 101	**Cole Burgess**	Nuclear or Solar, Why Does It Have to Be a Choice?
Poster # 102	**Jawad Iqbal**	Optimization of MATLAB Code for Faster and More Consistent Image Analysis
Poster # 103	**Melanie Kemp**	Electroformation of Giant Unilamellar Vesicles
Poster # 104	**Katherine MacManus**	Mechanical Characterization of Lipid Membranes Using Micropipette Aspiration
Poster # 105	**Katie Homeyer**	Nitric Oxide-Releasing Urinary Catheters as a Method to Prevent Urinary Tract Infections
Poster # 106	**Jennifer McCarty**	Improved Nitric Oxide-Releasing Polymer with Surface Exposed and Crosslinked Zwitterionic Polymer for Antimicrobial Applications
Poster # 107	**Sai Nagula**	Biocompatible, Biodegradable and Antimicrobial Skin Substitute with Nitric Oxide Release for Instant Burn Wound Treatments
Poster # 108	**Dieu Thao Nguyen**	Instant Clotting Patch to Prevent Excessive Bleeding during Emergency Injuries

Poster # 109	**Christina Workman**	Hydrophilic Top Coat on Nitric Oxide Releasing Surfaces for Enhanced Antibacterial and Antifouling Properties
Poster # 110	**Wilfred Oluwafemi Benard**	Design and Development of Bioengineered 3D Scaffold Using Novel Biomaterials for Tissue Regeneration Cell Culture
Poster # 111	**Dylan Munn**	Meat Consumption as an Indicator of the Near Term Stability of Each Country's Food Supply in the Global Marketplace
Poster # 112	**Ben Burgh**	Effects of Tracking Scale on User Performance in Virtual Reality Games
Poster # 113	**Ryan Snowden, Erica Anstey**	Automatic Recognition of Periocular Facial Alterations
Poster # 114	**Phiet T Do, Luis Perea**	Jamming Avoidance Response: An *Eigenmannia* Phenomenon
Poster # 115	**Kimberly Mercedes Shumaker**	Formation of Natural Product Glucosides by *Escherichia coli* in Controlled Conditions
Poster # 116	**Kevin Tuan Dong**	Development of Viscosity-Sensitive Fluorescent Molecular Rotors for Food Additives
Poster # 117	**Mary Catherine Lollis**	Evaluating Woody Tissue in Chicken Breast Samples with X-Ray, CT, and MR Imaging - A Pilot Study
Poster # 118	**Jonathan Chelena**	Effect of Ground Granulated Blast-Furnace Slag (GGBFS) on Heat of Hydration Concrete
Poster # 119	**Paul Coughlin**	Hurricane Risk Assessment of Georgia Coastal Bridges
Poster # 120	**Adara Dodson**	Beyond-Design Basis Evaluation of Georgia Coastal Bridges
Poster # 121	**Victor Lopez**	The Sustainability and Performance of Metakaolin and Blast Furnace Slag in Mass Concrete Production
Poster # 122	**Kevin Elliott Spicer**	Standards for Metakaolin Supplementation into Georgia DOT Concrete
Poster # 123	**Nicolas Rousseau Burgess**	Mechanical Ventilator Parameter Prediction

Poster # 124	**Laura Lanier**	The Development of a Pathogen-Specific Diagnostic Device for Pneumonia
Poster # 125	**Mayank Verma**	Visualization of Lung Inflammation
Poster # 126	**Haynes Curtis**	Design of a High Speed Water Tunnel and Associated Instrumentation
Poster # 127	**Grace Hays Darling**	Recycled Crumb Rubber for Use in Concrete Barrier Walls and Other Applications
Poster # 128	**Jake Michael**	Evaluation of Residential Basement Wall Concrete Mixtures for Water-Tightness and Reduction in Traditional Reinforcing Steel
Poster # 129	**Crystal Chu**	Development of Cellulose NanoFibrils (CNFs) Composites for Packaging Applications
Poster # 130	**Austin Etheridge**	Effects of Asphalt Mix Characteristics on Dynamic Modulus and Fatigue Performance
Poster # 131	**Jason Christopher Wright**	Investigation of the Effectiveness of Geosynthetics in North Georgia Soils
Poster # 132	**John Green II**	Design of Gallate-Based Persistent Phosphors in the Short-Wave Infrared Region
Poster # 133	**Amanda Pham, Darby Lyle Woodling, Marisa Stewart**	Mechanisms of Drug Resistance Based on Computational Studies of Taxol
Poster # 134	**Brian Lawrence Boland**	MRI Compatible Response Keypad for Communication with Nonverbal Subjects
Poster # 135	**Julian Moore**	Development of an Indoor Guidance System for Unmanned Aerial Vehicles with Power Industry Applications
Poster # 136	**Sarah E Clement**	Effect of Prescribed Burning of Riparian Zones on Stream Hyphomycete Fungi Productivity
Poster # 137	**Desirae Ann Dickerson**	The Effect of Litter Leachate from Fresh Riparian Rhododendron Leaves on Microbial Respiration in Headwater Streams in the Southern Appalachians

Poster # 138	**Reed Peloquin**	Do Changes in the Quality and Quantity of Leaf Litter Inputs Affect Growth Rates and Emergence of Stream Macroinvertebrate Consumers Following Reach-Scale Removal of Rhododendron?
Poster # 139	**Hend Rasheed**	Incorporating Individual Consumer Physiology into Our Current Understanding of *Littoraria-Spartina* Interactions within Southeastern US Salt Marshes
Poster # 140	**Alyson Ming Wright**	Studying the Effects of Valsartan on *Daphnia Magna*
Poster # 141	**Siva Venkatachalam**	Influence of Air Pollution and Socioeconomic Factors on Chronic Obstructive Pulmonary Disease (COPD)
Poster # 142	**Joseph Walker**	Mapping and Modeling Hotspots of Schistosomiasis
Poster # 143	**Sumaya El-Khalidi**	Nitrogen Fixation of Biological Soil Crusts in Longleaf Pine Savannas Respond to Alterations in Precipitation Frequency
Poster # 144	**Kelsey Morton**	Discovery of Foliar Endophytic Nitrogen Fixation in *Pinus palustris*
Poster # 145	**Sunishka Thakur**	Effect of Various Threat Categories on the Spatial Clustering of Threatened Mammals
Poster # 146	**Soo Min Lee**	Effect of Reproductive State on Parasite Infection in Wild Rodents
Poster # 147	**Erin Malsbury**	Local Perceptions of Wildlife in Samburu, Kenya
Poster # 148	**Isabella Mateu**	Is Serum Bacteria-Killing Ability in the African Bush Rat Driven by Complement?
Poster # 149	**Nam Money**	Comparing Activity Budgets between Adult and Juvenile Asian Elephants
Poster # 150	**Mackenzie Rose Pryor, Nam Money, Jessica C Respress**	Persistence of Extractive Foraging in Humans and Wild Tufted Capuchins (*Sapajus libidinosus*) Abstract
Poster # 151	**Lily Victoria Lee Wang**	Comparison of Female and Male Lone Star Tick Microbiomes in Watkinsville, Georgia

Poster # 152	**Emily Measel**	Testicular Toxicity of Bisphenol AF: Induction of Multinucleation of Spermatogonia
Poster # 153	**Maggie Holland**	Exploring Linkages between Environmental Degradation and Human Rights
Poster # 154	**Narissa Turner**	Shedding Light: A Study of Light Pollution on the UGA Campus
Poster # 155	**Olivia Lauren Sieverts**	Plasma Purification Method for Agglutination Assays in White Ibis
Poster # 156	**Sarah Hensey**	Assessing Toxicity and Contamination in Lake Herrick
Poster # 157	**Stephanie Stromp**	Bacteria-Phytoplankton Interactions in Understanding the Marine Carbon Cycle
Poster # 158	**Jessica Mei Brown**	Analysis of Genetic Diversity in *Asimina triloba* to Infer Historical Processes Responsible for Range Expansion
Poster # 159	**Liana Mosley**	Comparing the Incomparable: A Methodological Investigation of Water Limitation Treatments
Poster # 160	**Brandon Davis**	An Investigation of Environmental Variable and Dispersal Patterns of North American *Photinus* Fireflies
Poster # 161	**Pearl Shah**	Characterizing the Species Distributions of North American Pyractomena Fireflies
Poster # 162	**Garrett Vollino**	A Phylogenetic Analysis of *Pyractomena* Fireflies
Poster # 163	**Grace Manning**	The Effects of Salinity on *Helianthus*
Poster # 164	**Alex Morgan Smith**	Phosphorous Efficiency in Cultivated Sunflower
Poster # 165	**Becca Sussman**	Nitrogen Use Efficiency across Soil Fertility Treatments in Cultivated Sunflower
Poster # 166	**Darien Power**	The Persistence of Small Pollen Grains in Populations of *Ipomoea purpurea*
Poster # 167	**Ariane Wong**	Effect of the Female Frequency on the Pollen Dispersal Distance in Natural Populations of the Wild Geranium, *Geranium maculatum*

Poster # 168	**Krishna Patel, Eva Rodriguez**	A Method for Enrichment of Maize Stem Cells and Leaf Primordia
Poster # 169	**Brendan Fatzinger**	Effects of Microbe Activators in an Organic Agricultural System
Poster # 170	**Usha M Kaila**	How Does FoodCorps Contribute to the Pursuit of Farm to School Success?
Poster # 171	**Praharshak Asireddy**	Insect Resistance Characterization of *IRP9* in Soybean
Poster # 172	**Bryan Kamalaker**	Are *Wolbachia* Co-Obligate Nutritional Symbionts in the Banana Aphid *Pentalonia*?
Poster # 173	**Jacki McCollum**	Insects as a Nutritional Source in Horse Feed
Poster # 174	**Linden Pederson**	Variation in Egg Development in Deceased *Extatosoma tiratum* Females
Poster # 175	**Elizabeth Umanah**	An Investigation of RIN4 Phosphorylation in Plant Immunity
Poster # 176	**Diane Park**	Effect of Different Concentrations of 25-Hydroxycholestrol on Osteogenic Differentiation of Mesenchymal Stem Cells (MSC) from Broiler Compact Bone
Poster # 177	**Neil Doshi**	A Comprehensive Assessment of Cognitive and Motor Functional Outcomes After Traumatic Brain Injury in a Porcine Model
Poster # 178	**Lily Francis**	A Novel Porcine Model of Vascular Cognitive Impairment Demonstrates Changes in Cerebral Blood Flow and White Matter Tracts
Poster # 179	**Richard Dunstan Murray**	Novel Object Recognition: A Promising Approach to the Comparative Study of Memory in Porcine Vascular Cognitive Impairment Studies
Poster # 180	**Kelly Marie Scheulin**	Nanoparticles Transport of FDA-Approved Drugs Across the Blood Brain Barrier in a Porcine Stroke Model
Poster # 181	**Naomi Afnan Siddiquee, Noah Goldstein**	An In Vitro Model Demonstrating the Direct Current Stimulation Mediated Recovery from Neuronal Injury

Poster # 182	**Adir Mohaban**	Small Molecule-Stimulated MSC Adhesion to Enhance Atopic Dermatitis Therapy in Companion Animals
Poster # 183	**Tarun Daniel, Aditya Sood**	Analyzing TGF-β Regulation of the Progenitor Motor Neuron/Motor Neuron Glial Fate Switch
Poster # 184	**Jacy Donaldson**	Relationships and Trade Offs between Food Insecurity and Healthcare
Poster # 185	**Alexandra Case**	Motivations and Barriers of Volunteering among College Freshmen
Poster # 186	**Mariam Ahmed**	Microglia Activation in Rostral Nucleus Tractus Solitaries After Roux-en-Y Gastric Bypass Surgery
Poster # 187	**John Zachary Benton**	Gold Nanoparticles, Cytotoxicity and Radiosensitization in a Feline Vaccine-Associated Sarcoma Cell Line, In Vitro
Poster # 188	**Adrea Mueller**	Adaptation of a DNA Purification Protocol for 3rd Generation Sequencing of *Eimeria* Species
Poster # 189	**Stephanie Alexandra Pierre**	Effect of Sample Collection at Various Collection Sites on the Detection of *Mycoplasma Synoviae* by Real-Time PCR
Poster # 190	**Ebun Dada**	Histological Comparison of Various Coccidial Control Programs Used in Commercial Poultry
Poster # 191	**Christina Valentini**	Understanding the Role of Social Determinants in Drug Overdose Deaths in Georgia
Poster # 192	**Aaron Adams**	Creation and Testing of Myogenic Promoter Reporter System in C2C12 Cells
Poster # 193	**Umar Muhammad Ghilzai**	Creation of Genetically Modified Pomgnt2-Knockout Neuro2A and C2C12 Mouse Cell Lines by CRISPR/Cas9 Gene Targeting to Further Understand Dystroglycanopathies
Poster # 194	**Morgan Gibbs**	Probing the Structural Basis of P-Glycoprotein Transport of μ-Opioid Receptor Agonists: Methadone and Loperamide
Poster # 195	**Baker Edrees**	Identification of Therapeutics that Target Zika Virus RNA Polymerase
Poster # 196	**Kyana Breche' Morris**	An Analytical Evaluation of the Compounding Skills of Pharmacy Students

Poster # 197	**Hiral Patel**	Cytotoxic Effects of Novel Compounds on Clinically Challenging Cancer Cell Lines
Poster # 198	**Michael Linzey**	Sensitive Liquid Chromatography/Tandem Mass Spectrometry Method for the Determination of a Novel Highly Lipophilic Anti-Cancer drug Candidate in Rat Plasma and Kidney Tissue
Poster # 199	**Aamanya Raval**	Biophysical Characterization of Human Transketolase (TKT) and Transketolase-Like Protein (TKTL-1) Interactions with the Thiamine Diphosphate Cofactor
Poster # 200	**Daiannette Lopez**	Tail Ischemia Associated with Arterial Catheters in the Coccygeal Artery: A Case Series
Poster # 201	**Dru Adams**	Comparison of Anabolic Growth Factor Elution from Thrombin/Calcium Chloride Activated Platelet-Rich Fibrin Gels and Platelet-Rich Chondroitin-Sulfate Glycosaminoglycan Gels
Poster # 202	**Maggie Pritchett**	In Vitro Activity of Gallium Maltolate against Drug-Resistant *Rhodococcus equi*
Poster # 203	**Susie Jones**	PCR Detection of the SRY Gene of Male Dog Mesenchymal Stem Cells in Female Dog Brains with Experimentally Induced Ischemic Stroke
Poster # 204	**Sierra Megan Smith**	Affect of Capsiate on Perirenal and Epididymal Fat in Rats Fed a High Fat Diet
Poster # 205	**Madeline Young**	The Role of Chondrogenic Growth Factors in the Pathogenesis of Equine DSLD
Poster # 206	**Mevelyn Kaalla**	Significance of MARCO in *Mycobacterium tuberculosis* Resistance
Poster # 207	**Isabelle Veigh Snider**	The Novel Function of RGS10 in Obesity
Poster # 208	**Gazal Arora**	The Effects of Phthalate Exposure in Female Germ Cells
Poster # 209	**Wendi Bao**	Depletion of a Key Maternal Protein Impairs Early Embryonic Development
Poster # 210	**Madison Cook**	Exposure to Synthetic Estrogens Disrupts Meiotic Division in Germ Cells

Poster # 211	**Rahul Katkar**	Isolation of VAR2CSA DBL3x Binding Domains for Protein Expression
Poster # 212	**Trisha Dalapati**	Effects of *Plasmodium falciparum* Derived Hemozoin on Expression of Inflammatory and Coagulation Factors in BeWo Cells
Poster # 213	**Hayley Reynolds**	Lassa Virus GP1 Glycoprotein Receptor Binding Site Characterization
Poster # 214	**Nicholas Ciappa**	Examination of *Mycobacterium tuberculosis* Protein Expression in Infected Lung Tissue
Poster # 215	**Connor Grady**	Characterization of Antibody Response and Cell-Mediated Immune Response to Seasonal Influenza Vaccination
Poster # 216	**Matthew Prellberg**	Chikungunya Virus-Like Particles Vaccine Formulations that Elicit Balanced Th1/Th2 Response in Mice
Poster # 217	**Emma Harrison**	Understanding the Determinants of Seeking Medical Attention for Injury
Poster # 218	**Alyssa Varsalona**	Association Between Ankle Sprain History and Current Ankle Sprains in Collegiate Club Sports Players
Poster # 219	**Alexandra Bronwen Flemington**	Volumetric Muscle Injury on Mitochondrial Function
Poster # 220	**Anita Qualls**	Early Rehabilitation to Augment Skeletal Muscle Function Following Volumetric Muscle Loss Injury
Poster # 221	**Shaun Goh**	Limb Elevation as a Model for Peripheral Arterial Disease
Poster # 222	**Riley Jenkins**	Mitochondrial Capacity in Young, Well-Controlled People with Type 1 Diabetes
Poster # 223	**Bethany Toney, Riley Jenkins**	The Effects of Type 1 Diabetes on Skeletal Muscle Endurance
Poster # 224	**Rachel Aldridge, Nivita Sharma**	Comparing the AX3 and MetaSensor Accelerometers for Measuring Muscle Twitch
Poster # 225	**Nivita Sharma, Rachel Aldridge**	Using Electrical Stimulation to Lower Post-Prandial Blood Sugar in People with SCI

Poster # 226	**Nicole McGarrell**	Endurance Training in Patients with Friedrich's Ataxia
Poster # 227	**Diana Springer**	Limb Elevation as a Model of Peripheral Arterial Disease
Poster # 228	**Sydney Michelle Mohr**	The Difference Between Men and Women in the Effects of Exercise on Circulating Angiogenic Cells
Poster # 229	**Olivia Mendel**	Glycome Profiling of Medaka Exposed to Chronic, Low Level Ionization Radiation
Poster # 230	**Nitin Daniel**	Structural Analysis of a Predicted Skp1 GlycosylItransferase PuGT8A
Poster # 231	**Haley Folmar**	Biophysical Properties of Pectins Isolated from Seed Mucilage of *Arabidopsis thaliana* Wild-type and gaut11-2 Mutant Plants
Poster # 232	**Nikhil Reddy Gangasani**	Fighting a Pathogen with Its Own Medicine: Enzymatic Preparation of Carbohydrates for Effective Immune Response
Poster # 233	**Joseph Elengickal**	Regulation of Sialic Acid Polymerization
Poster # 234	**Manasa Kadiyala**	Identification of MAb109 Epitope in Pancreatic Cancer Cells
Poster # 235	**Stephan Nicholas George**	Characterization of Causative Mutations in OGT for XLID
Poster # 236	**Jessica Ziling Ho**	Development of a Droplet Digital PCR Assay for Pre-NGS Quality Assessment of DNA from FFPE Specimens
Poster # 237	**Patrick Thomas Seethaler**	Understanding Toxicity of *Botrytis cinerea* Mutant
Poster # 238	**Jesse Hu**	Characterization of Cas4 Activity in the CRISPR-Cas Systems of *Pyrococcus furiosus*
Poster # 239	**Leslie Adams**	Single Subunit Over Expression of NfnI in *Pyrococcus furiosus*
Poster # 240	**Alex Thomas Crowley**	Ethanol Production in *Pyrococcus furiosus* using High Temperature Alcohol Dehydrogenase AdhC

Poster # 241	**Christina Marie Najjar**	Investigation of NAP1 as Reporter for CaaX Protein Post-Translational Modification Shunt Pathway
Poster # 242	**Weston Ellis McDonald**	The Conservation of Allostery in *C. Elegans* UDP-Glucose Dehydrogenase
Poster # 243	**Caria Evans**	Development of Biodegradable and Biosourced Microcellular Polyurethane Foams for Foam-In-Bag Packaging
Poster # 244	**Jonathan Spagnoli**	ROS-Responsive and pH Inhibiting Polymer Nanoparticle Platform for Cancer Treatment
Poster # 245	**Eric Wayne Hua, Devanshi Nayak**	A Comparison of the Catalytic Activity of Tryptophan Synthase from *Salmonella* and *Photobacterium* at Various Temperatures and Pressures
Poster # 246	**Nathan Likens**	Nanofibrous Pectin Scaffolds for Biomedical Applications
Poster # 247	**Yeonsoo Park**	The Isolation of *C. elegans* Germ Cell Line
Poster # 248	**Branson Byers**	Characterizing the Role of Inhibitory Neurons in Regulating Seizure Activity in Embryonic Zebrafish
Poster # 249	**Katie Elyse Irwin**	Determining the Development of the Parietal Eye in Brown Anoles
Poster # 250	**Benjamin Martin Kidd**	Elucidating the Function of GABAergic Signaling during Neural Development in Larval Zebrafish
Poster # 251	**Sydney Williams**	Investigating the Function of GABAergic Signaling during Neural Development of Zebrafish
Poster # 252	**Me'Shae Johnson**	Metacognitive Regulation in Undergraduate Biology Students
Poster # 253	**Bethany Osueke**	Introductory Biochemistry Students' Use of Learning Objectives
Poster # 254	**Gehrig Broxton**	Using Chlamydomonas as a Model for Oral-Facial-Digital Syndrome
Poster # 255	**Rachel Vaizer**	The Ciliary Gliding Motility in Eukaryotes

Poster # 256	**Stephanie Nguyen**	Using Serological Tools to Measure the Prevalence of Filarial Infection after Mass Drug Administration
Poster # 257	**Rajeev Subu**	In Vivo Assessment of Olfactory Receptor Neurons and Projection Neurons Using Appetitive Olfactory Inputs in *Drosophila* Larvae
Poster # 258	**Nidhi Aggarwal**	Attenuation of *Trypanosoma cruzi* by Fatty-Acid **β**-Oxidation Monotetraallelic Knockouts
Poster # 259	**Evelina Kravchuk**	Tagging Fatty Acid Metabolism Proteins in *Trypanosoma cruzi*
Poster # 260	**Tre Justin Landry**	Measuring the Expression Efficiency of Constructed Single Plasmid System in *Trypanosoma cruzi*
Poster # 261	**Lilith Renae South**	Investigating CRISPR/Cas9 as a System for Gene Editing in *Trypanosoma cruzi*
Poster # 262	**Adam Greg Aston**	Mechanistic Relationships Between Mga and Myc During Zebrafish Development
Poster # 263	**Shanlin Shoemaker**	Proteomics of CBL0137-Treated *Trypanosoma brucei*
Poster # 264	**Obi Okafor**	Characterization of Genes Predicted to Function in Signaling for Expression of RNA Repair Operon in *Salmonella enterica* serovar Typhimurium
Poster # 265	**Andrew Charles Wise**	Environmental Conditions That Activate the *E. coli* RNA Repair Operon
Poster # 266	**Annie Hass**	Investigation into Surface Glycan Variation in *Campylobacter fetus* Species
Poster # 267	**Sheena Vasquez**	Structural Insights into the Role of [2Fe-2S] Clusters in Bacterial Ferrochelatases
Poster # 268	**Akiel Gabriel Etienne**	In Vivo and In Vitro Activity Analysis of Acetylation on Fructose-1, 6-Bisphosphatase in *Salmonella enterica*
Poster # 269	**Rebecca Marie Gardner**	Overexpression and Characterization of Two Pectate Lyases from *Paenibacillus amylolyticus*
Poster # 270	**Jonathan David Hill**	Investigating the Role of HPG27_395 in *Helicobacter pylori*

Poster # 271	**Hirel B Patel, Ben Park, Kyler Herrington, Ghazal Motakef**	Building the Genetic Tools to Make *Methanococcus Maripaludis* the Next-Generation Model Chassis for Biochemical Production
Poster # 272	**Mallorie Lee Huff**	Development of an Inducible Histone Methyltransferase System to Analyze Establishment of Repressed Chromatin Domains in *Neurospora crassa*
Poster # 273	**Annika Carter**	The Insect Version of Oxytocin Influences Female Tolerance of Males in a Subsocial Beetle
Poster # 274	**Madeline Sparks**	Morphological Attributes Underlying Feeding Ability in Burying Beetles
Poster # 275	**Cord Helmken**	Developing a Protocol for Large-Scale Toxicity Assays Using Flow Cytometry
Poster # 276	**Lauren Dunavant**	Reprogramming Mouse Embryonic Fibroblasts via Induced Expression of *Foxn1* and *Foxg1* Transcription Factors to Generate Induced Thymic Epithelial Cells (iTECs)
Poster # 277	**Cherien Z Abou-Harb**	Life History Traits of *Boechera stricta*
Poster # 278	**Kathryn McKibben**	Climate Change and Gene Flow Rates in *Boechera stricta*
Poster # 279	**Katelyn Chandler**	Transcriptomic Investigation of Disease Tolerance in the Ochre Sea Star *Pisaster ochraceus*
Poster # 280	**Kaley Ann Desher**	Investigating Genes Implicated in Ciliogenesis Using CRISPR/Cas
Poster # 281	**Sophie Alexandra Barton**	Examination of Courtship Songs Across *Drosophila subquinaria* Populations
Poster # 282	**Amy Nguyen**	Evolution of Body Size in *Drosophila Subquinaria*
Poster # 283	**Zehra Rahman**	Investigations on the Distinct Isoforms of Duffy Antigen Receptor for Chemokines
Poster # 284	**Lauren Taylor Wassel**	The Expression of the Duffy Antigen Receptor for Chemokines in the Triple Negative Breast Cancer Cell Line, HHC1806

Poster # 285	**Brooke Aspinwall**	Multimerization of Long DNA Inserts via Bombardment
Poster # 286	**Brianna Renee English**	Genetic Mapping of the Chromosome Variant K10-L2 in Maize
Poster # 287	**Sehar Ali**	Investigating Performance of *Agraulis vanillae* on *Passiflora incarnata*: A Geographic Mosaic Approach
Poster # 288	**Atul Lodh**	Investigating the Role of Cyanogenic Glycosides as a Potential Defense for *Passiflora incarnata* against *Agraulis vanillae*
Poster # 289	**Chandler Elizabeth Johnson**	An Inquiry into the Role of SUT5 and SUT6 in the Release of Exudate at the Extrafloral Nectaries of *Populus tremula x alba*
Poster # 290	**Jacob Reeves**	Variant Identification Using RNA-Seq Data for Improvement of CRISPR gRNA Design in Hybrid *Populus*

Oral Session V: 9:30-10:45 a.m.
Athena Breakout Rooms A, B, C, D, G, H

Room A	**Kendall Lee**	A Preliminary Evaluation of Supplemental Vitamin E Form on Serum α-Tocopherol Levels and Oxidative Stress Parameters Measured in Response to a Novel Exercise Challenge
	Caroline McElhannon	Rapid Control of New Infections with *Trypanosoma cruzi* in Previously Infected Mice
	Sophie Alexandra Barton, Sreinick Keo, Rushi Ketan Patel	Unfamiliar Stone Hammer Use in Juvenile Bearded Capuchin Monkeys
	Isabel Ott	Investigating a Potentially Novel Cache Valley Virus Variant in a Clinical Case in Missouri
Room B	**Nadine Fares**	Green Greenhouses: An Application of Energy Informatics
	Miranda Russell	Books for Keeps' "Stop Summer Slide!" Program and its Impact on Literacy Levels in Clarke County Schools
	Ana Duron-Fleck	The Effectiveness of Financial Education Mandates in Georgia Public High Schools
	Kavi Pandian	South African Wineries and the US Wine Market
Room C	**Ryan Switzer**	Hunting for Homology: The Role of Working Class Pride in Modern Skinhead Subcultures
	Jessica Garcia	Fake News: The New Propaganda Machine
	Emma Katherine Protis	No Longer Used: Designing Non-Exploitative Communication for Organizations Seeking to End Human Trafficking
	Magali Lapu	Unlock the Vote: The Implications of Felon Disenfranchisement Laws on the Political Power of African Americans
Room D	**Jared Conner**	Mushroom Biochar: The Properties and Potential Applications of Novel Biochars Derived from Mushroom Fruiting Bodies

	Lexi Blue Ritter	The Role of Histone Modification in Splicing and the Tethering of ps-mRNA
	Evan Barnard	Organic Fertilizer Improves Revegetation of Roadside Soils
	Cecelia Giangacomo	Analysis of Discrimination Methods for Amplifying the Microbiome from Plants
Room G	**Anna Jewell Davidson**	Privileged Perception: An Examination of Supersensory Insight in Vladimir Nabokov's *The Gift*
	Kate Huller	Religion in Fantasy: Christian and Wiccan Protagonists as Vessels for Gendered Religious Ideals
	Sachi Shastri	Unalterable Roots
	Michael Sloman	The Chthonic Elements of Mithraic Worship
Room H	**Rebekah Trotti**	Emotional Modulation of the Late Positive Potential
	Sarah Robinson	Propagation of Errors in Single Cell Oscillatory Time Series to the Periodogram
	Sang M Lee	Current Investigations of Chromium Photocatalyzed [4+2] Cycloadditions
	Chandler Mulford	Application of Heel Lift during Squat Task Decreases Trunk Flexion Overcompensation

Oral Session VI: 11:00 a.m.-12:15 p.m.
Athena Breakout Rooms A, B, C, D, G

Room A	**Abraham Branch Johnson**	Pressuring Playwrights: New Play Development for Contemporary Stages
	Gabrielle Stecher	A Movie without a Hero: Casting Becky Sharp in Early Hollywood Cinema
	Shawn Christian Foster	Dialect Variation in the American South
	Audrey Miller	The Call of the Crypt Keeper: E.C. Influences in the Films of George A. Romero

Room B	**Emily Edwards**	Disordered Drinking in College Populations: An Identity Issue?
	Madison Lorene Brumbaugh, Jacob Scott Kepes	Georgia Monetary Sanctions
	Kavi Pandian	Reducing School Discipline Disparities and Excesses in K-12 Education in the State of Georgia
	Andrea L Morrison	Pregnancy Planning and Prevention
Room C	**John Newman**	The Effects of Aging on Neuroblast Proliferation in the Pivotal Lateral Ventricle Region: A Canine Model
	Sarah Vaughn	The Effect of Insulin Dysregulation and Breed on HPA Axis Function and Plasma Cortisol Binding Dynamics in Ponies and Horses
	Luke McGrory	Effects of 25-Hydroxycholecalciferol on Bone Growth and Development in Laying Pullets
	Erik Olsen	The Effect of High-Fat Diet in Altering the Metabolism of Mice with Differing Expressions of RGS10
Room D	**Alison Kay Adams**	Density-Dependent Selection Model for the Sociality of *Ceratina (Neoceratina) australensis*
	Michael Christian Morgan	Identifying Novel CAAX Motifs Using YDJ1 as a Reporter
	Johnathan Martin Mayfield	Communicating the Importance of Microbial Symbionts to the Public
	Rachel Thomason	Discovering the Antimicrobial Effect of the Lactoperoxidase/Hydrogen Peroxide/Thiocyanate System against *Streptococcus pneumoniae*
Room G	**Joshua R Willis**	Habitat Provision Associated with Environmental Flows
	Simran Rajput	Branched-Chain Amino Acid (BCAA) Transporters: Mechanism, Physiological Function and Roles in Cancer
	Betsi Micholas	Nanocellulose Based Drug Loaded Micro/Nanoparticluate for Therapeutic and Drug Fate Analysis

	Alexandra Carlton	Role of Bacterial Polysaccharides in Bacteriophage Invasion

Oral Session VII: 12:30-1:45 p.m.
Athena Breakout Rooms A, B, C, D, G, H, I, J

Room A	**Anita Qualls**	Time is Brain: Expanding Access to Stroke Care in Rural Georgia Communities
	Aaron Conley	The First Amendment Protections Afforded to Student Newspapers at Public Universities
	Jackson Hopper	Analogies between Numbers and Polynomials
	Caskey Dyer	Atlanta, Race, and Housing: Racial Segregation in the Context of the Great Recession
Room B	**Ammishaddai Sully Grand-Jean**	Reducing Homelessness in Atlanta
	Jennifer Ashtyn Hardister	Fund Balances in Georgia's Cities
	Andrew Michael Teal	Congressional Complexity: Modernizing Financial Legislation
	Nancy Saucedo	United States Corporate Tax Reform: Keeping Capital within US Borders
Room C	**Joshua A Kalter**	Characterizing the Ribonuclease Activity of *Staphylococcus epidermidis* Csm6
	Laurel Hiatt	Biochemical Investigations of Congenital Disorders of N-Linked Glycosylation
	Anne Kathryne Belocura	Optimized Enzyme-Linked Immunosorbent Assay to Assess Anti-Neuraminidase Response in Human Sera
	Christian Chandler Cullen	Neutrophil Extracellular Trap Induction Dependence on Flagellar Motility
Room D	**Samantha Askin**	Changes in Distribution of Black-Bellied Whistling Ducks (*Dendrocygna autumnalis*) in the Southern Atlantic Flyway
	Casey Lawrence	Blood Transfusion Related Zika Virus Transmission

	Logan Ruiz	Analysis of Different Methods for Quantitative Western Blot Analysis in the Avian Model System
	Roland Francis Seim	Saharan Dust Increases Amount of Vibrio Pathogens in the Florida Keys
Room G	**Nicholas D Weinand**	Derivation of Aerosol Optical Depth and Total Column Ozone via DOBSUN Instrument
	Aubrey Wheeler	Utilization of Organic Synthesis to Investigate Molecular Organic Frameworks
	Caleb Ashmore Adams	The Feasibility of Structure from Motion over Planetary Bodies with Small Satellite Systems
	Autumn Nobles	Archaeometry of Argentinean Rock Art
Room H	**Manisha Banga**	Revising the Classics: Modern and Contemporary Female Authorial Treatment of Unactualized Characters from Greek Myth
	Reilly Megee	Admit One: Analyzing the Myriad of Pathways into the Design Industry
	Catherine J Huff	Desires for Difference: Tastes and Collecting of Later Nineteenth-Century American Paintings
	Jesse Riley	Digital Timeline of Mina Loy's New York Years 1937-1953
Room I	**Morgan Green**	Influence of Corrective Exercise Compliance on Physical Activity Levels and Perceived Functional Abilities
	Jamie Pham	A Look into the Contents of Faculty Learning Community Meetings of STEM Professors
	Kalvis Golde	The Convergence of Quantum Physics and Religious Mysticism
	Amita Joshua	Depression and Risky Health Behaviors: The Moderating Effect of Coping Responses
Room J	**Hannah Turner**	The Price We Pay: Analyzing the Over-Incarceration of Low-Level Juvenile Offenders in Georgia
	Peyton Sammons	All-Source Fusion in Combatting The Global Terrorist Threat

	Emmanuel Elsar Jr.	Has Gentrification Led to Increased Police Brutality in the United States?
	Jessica Jin Suh	Open Versus Structured Rules: Examining the Policy Effects of Rule Choice in the House of Representatives, 2003-2016

Oral Session VIII: 2:00-3:15 p.m.
Athena Breakout Rooms A, B, C, D, G

Room A	**Vineet S Raman**	Healthcare for All: A Roadmap for a Healthier Georgia
	Hannah Bass	Obstructed Labor: Analyzing Realistic Implementations for Developing Countries to Decrease Maternal Morbidity
	Lauren Jayne Lauterbach	Socioculturally Attuned Family Therapy: Guidelines for Equitable Theory and Practice
	Maggie Spears	Homeschooling and Its Effect on the Parent-Child Relationship
Room B	**Ashley Elizabeth Lall**	The Chromatin Remodeling Protein, ATRX, Regulates the Formation of Non-Canonical DNA/RNA G-Quadruplex Structures in Mammalian Oocytes
	Ana Maslesa	Bone Characterization in the Treatment of Hypophosphatasia with Mesenchymal Stem Cells
	Sholeh Namdari	Glycosylation in Spores
	Catrina Kure	The Role of LNFPIII-Dex on Cholesterol Efflux in Raw 264.7 Cells
Room C	**Luke Gamblin**	Effects of Acid Rain on *Brassica rapa*
	Robert Erwin Hines	Shoring Up Dam Safety: Risk Assessment Via Simplified Inundation Mapping
	Grace Anne Ingham	Sensitivity of Heterotrophic Soil Respiration (HSR) to Temperature as Mediated by Mycorrhizal Fungi
	Harris Jamal	Depth Gradient Analysis of Potential *Vibrio* Pathogens in Subtropical Marine Water After the Arrival of Atmospheric Saharan Dust

Room D	**Caroline Shearer**	Parasite Infection, Group Size, and Feeding Behavior in Grant's Gazelle
	Marrissa Jean Blackwell	The Effect of Sericea lespedeza on Strongyle Fecal Egg Counts in Mature Horses
	Kayla Jordan Smith	Effects of Vegetation Structure on Nest Predation of Artificial Diamondback Terrapin Nests
	Cody Alan Swint	Effects of Condense Tannins from *Lespedeza cuneata* on Oxidative Stress in Horses
Room G	**Rara Reines**	African Agency in Policy and Project Autonomy: An Analysis of Investment Promotion Centres in Rwanda, Botswana, and Lesotho
	Adrien Sandercock	Legislative Complexity in an Increasingly Competitive Electoral Environment
	Tucker Boyce	The Role of Technology and Statements in the July 2016 Turkish Coup Attempt
	Bilind Amedi	Geography of Kurdistan

Oral Session IX: 3:30-4:45 p.m.
Athena Breakout Rooms A, B, C, D, G, H, I, J

Room A	**Vineet S Raman**	Tablet-Based Data Collection for Leprosy Field Surveys
	Trey Powell	Investigating the Use of mRNA Transfection to Treat Hypophosphatasia
	Dianna Wong	Developing a Sub-Viral Particle Dengue Vaccine Using Computationally Optimized Broadly Reactive Antigen (COBRA) Technology
	Sarah Elizabeth Brown	Biochemical and Structural Characterization of vOTUs from Ganjam and Hazara Nairoviruses
Room B	**Nicholas Twiner**	Applicatives in Southern English
	Anna Kay McKenzie	A Comparison of Muslim and Jewish Cultural Impacts on Spanish Society in Relation to Punishments for Practicing These Religions during the Spanish Inquisition

	Leighton Carlock	Women's Fate
	Aisling Mohini Manison	The Effectiveness of Music Therapy Techniques for Improving Second Language Acquisition in Adult ESL Students
Room C	**Bessie Lockwood**	Distribution of Ticks on Cervids and Prevalence of Selected Tick-Borne Pathogens in These Ticks from Kentucky
	Margaret Zacharias	Long-Term Population Dynamics Pre-Die Off of the Vermetid Gastropod, *Ceraesignum maximum*, in Mo'orea, French Polynesia
	Anh Hoang Thi Nguyen	Investigation of Antimicrobial Resistance in *Salmonella* and *Escherichia coli* isolated from the Upper Oconee Watershed
	Tyler Moore	Are Urban Birds in South Florida Reservoirs of Salmonella spp. for the American White Ibis (*Eudocimus albus*)?
Room D	**Ryan Freeman**	University of Georgia Amending and Roll Call Project
	Will Russell Vineyard	An Insight into Organizational Use of Business Process Management Tools and Technologies: An Exploratory Examination
	Trace Calloway	The Affordable Care Act's Effect on Perceived Mental Health Outcomes and Substance Abuse Treatment
	Elizabeth Alexandra Hardister	Religious Terrorism and Weapons of Mass Destruction
Room G	**Megan Le Corre, Graham Grable**	Structural Design and Optimization of the SPOC Cube Satellite
	Taylor Beth Timmons	Plasticization of Nanocellulose Gel
	Cathy Lee	From Trash to Fashion: Converting Polyethylene Terephthalate into Fabric
	Khoa Minh Ngo	Simulation of Small Satellite Photovoltaic Power Generation System
Room H	**Jordan Eckert**	Predicting Horse Racing Outcomes Using Multinomial Logit and Probit Modeling Techniques

	Fernando Arturo Cruz	An Exploratory Investigation: Examining the Current and Future Prospects of Organizational Use of Business Process Management Tools and Technology
	Matthew Wicker	Two Dimensional Visualization of Higher-Order Relations in Biological Graphs
	Lydia Liu	Consumers as Curators: Brand Use in Social Media
Room I	**Ginny Lee Olivier**	Examining Younger Age at Menarche in Mexican-American Girls
	Maddie McGarrah, Jacklyn J Byrd	Fluidity of Identity Among Older Gay Men
	Rhiannon Euhus	The Association between Body Image Dissatisfaction and Sports Participation in Mexican-American Youth
	James Conners	Effect of Mythic Primers on Psychological Well-Being
Room J	**Madison Demetry**	Testing Immune Function in Naked Mole Rats During Periods of Wound Healing
	Brooke Hull	Genomic Editing of *Neurospora crassa* as a Tool for Studying Circadian Cycle Synchronization
	Hannah Packiam	The Effects of Temperatures on the Stability and Infectivity of Arboviruses
	Maddie Gloeggler	Assessment of Oxidative Stress and Serum α-Tocopherol Levels in Exercising Horses in Response to Level and Form of Vitamin E Supplementation

Abstracts

Life History Traits of *Boechera stricta*

Cherien Z Abou-Harb, CURO Research Assistant
Dr. Jill Anderson, Genetics, Franklin College of Arts and Sciences

Life history trait correlations are used to determine the evolution of life history strategies aimed at optimizing an organism's survival and reproductive fitness. Life history traits are typically: responsive to resource availability, heritable, and under strong selection. Therefore, life history trait correlations indicating enhanced adaptation (positive trait correlation) or genetic constraint (negative trait correlation) to life history trait evolution can be mediated by resource availability. Current predictions associated with climate change suggest altered precipitation patterns will shift water and nutrient availability along an elevational gradient in montane systems. Here, we investigate the role of altered resources on life history trait correlations at family and population levels in an ecologically relevant model organism, *Boechera stricta*. In a greenhouse setting, we will cross three water treatments (wet, semi-drought, and drought) with three nutrient treatments. We will record life history traits including growth, timing of reproduction, and number/size of offspring. We predict family level trait correlations may indicate trade-offs while the overall population level response may suggest enhanced adaptation due to variation in family resource acquisition. Most life history traits correlations are taken on a population level. However, this study will show that trait correlations at the genotypic level may vary, and test whether environmental stress will drastically alter life history trade-offs.

The Impacts of Narcissism on Individual Status in Interdependent Teams

Joshua Acosta
Erica Medrano, Allie Martin
Dr. Dorothy Carter, Psychology, Franklin College of Arts and Sciences

An individual's status in an organization can determine his or her access to important material and social resources; however, there are many individual-level characteristics that may determine whether or not an individual achieves the status necessary to succeed in their organization. Specifically, an individual's level of narcissism may greatly impact whether they are viewed as high status or low status members of their organization. Thus, the purpose of this study is to evaluate whether narcissism is a beneficial characteristic for achieving status. We assert that higher levels of narcissism will positively predict incoming status nominations in interdependent organizational contexts. We test our hypotheses in a sample of 240 undergraduate participants assembled into 20 unique 12-member teams tasked with combining disciplinary knowledge in a complex problem-solving task. Participants responded to self-report sociometric measures of status perceptions in relation to their teammates. We will analyze data from these surveys using a class of inferential models of network emergence called exponential random graph models, which identify key predictors of networked relationships. Our findings suggest important implications for organizations, because if narcissists are more likely to achieve status in organizations, they may overwhelmingly control important resources. In fact, although narcissism is related to leadership emergence, the trait has conflicting results predicting leadership effectiveness; thus, biasing status toward those with narcissistic tendencies may impede overall effectiveness of organizations.

Creation and Testing of Myogenic Promoter Reporter System in C2C12 Cells

Aaron Adams, CURO Research Assistant
Dr. Aaron Beedle, Pharmaceutical and Biomedical Sciences, College of Pharmacy

Transcription factors are proteins that bind the promoter region of a gene and alter the expression of that gene by activating or suppressing the affinity for RNA polymerase. Transcription factors allow for coordination in the expression of genes used in complex biological pathways. Muscle regeneration, for example, is controlled by a family of transcription factors, called myogenic transcription factors, which include: Myog, Myod, Myf5, and Myf6. Through the use of cloning and transformation in *E.coli* bacteria, a plasmid containing the promotor sequence of these myogenic transcription factors upstream of a destabilized fluorescent protein was created. By transfecting C2C12 muscle cells with this plasmid, we hope to create a real-time method for

visualizing the expression of the four myogenic transcription factors.

Density-Dependent Selection Model for the Sociality of *Ceratina (Neoceratina) australensis*

Alison Kay Adams, CURO Summer Fellow
Dr. David Hall, Genetics, Franklin College of Arts and Sciences

Ceratina (Neoceratina) australensis, the Australian small carpenter bee, is socially polymorphic with both solitary and social nests collected in the same populations. Solitary nests contain a single adult female and her developing brood and social nests contain two adult females and their brood. Research has shown that solitary nests tend to produce more offspring per female than social nests, but only when a parasitic wasp is absent. When the wasp is abundant, solitary nests suffer high levels of parasitism and loss of brood. Thus, solitary nests do worse in the presence of wasps and better in their absence. The parasitic wasp does better when solitary nests are common and worse when they are rare. These effects are hypothesized to allow maintenance of both nest types in bee populations: when solitary nests are dense, the wasp increases in numbers, which leads to an advantage for social nests, and vice versa. To address this hypothesis, several mathematical models were developed to capture the biology of this system. The models were analyzed to determine whether a stable equilibrium with both social and solitary nests was possible. Such equilibrium was found, indicating that the parasitic wasp may be what permits the existence of the social polymorphism in the bee in nature.

The Feasibility of Structure from Motion over Planetary Bodies with Small Satellite Systems

Caleb Ashmore Adams, CURO Summer Fellow, CURO Research Assistant
Dr. Marguerite Madden, Geography, Franklin College of Arts and Sciences

The majority of works using point clouds employ 3D representations from terrestrial/aerial LiDAR, but progresses in computer vision have made available a series of algorithms that allow for the generation of point clouds and surfaces that do not need a point-based collection characteristic of LiDAR systems. One such algorithm, Structure from Motion (SfM), can extract 3D features and reconstructions of objects/structures based on multiple photographs or video frames. The Mapping and Ocean Color Imager (MOCI) Satellite we are designing and constructing in the UGA Small Satellite Research Lab will use these techniques on a space-based platform and run a series of machine vision algorithms to produce a topographical mesh from MOCI-acquired images. A Scale-Invariant Feature Transform (SIFT) is first performed on the image set. A sparse point cloud, consisting of points identified as similar between a series of images, can be computed from a combination of SIFT and the parallax of satellite with its target area. This sparse point cloud can then be used to compute a dense point cloud. A surface mesh is computed with Poisson surface reconstruction. Initial tests have been performed to determine the feasibility of SfM mapping in Low Earth Orbit (LEO). Tests consisted of scaled graphics models in Blender software. Automatic scripts and programs were used to simulate image acquisition, then SfM was performed on the image set. Initial tests have shown SfM to be feasible at a landscape scale. Planetary SfM was performed with data from the International Space Station (ISS); it was demonstrated that cloud lines could be distinguished. Surface maps of Pluto were also generated using SfM with available data from the New Horizons Pluto fly-by.

Comparison of Anabolic Growth Factor Elution from Thrombin/Calcium Chloride Activated Platelet-Rich Fibrin Gels and Platelet-Rich Chondroitin-Sulfate Glycosaminoglycan Gels

Dru Adams, CURO Research Assistant
Dr. Sam Franklin, Small Animal Medicine and Surgery, College of Veterinary Medicine

Platelet-rich plasma (PRP) is commonly used to deliver anabolic growth factors to tissues in order to encourage tissue regeneration. However, previous studies have shown that growth factors are eluted very rapidly from PRP, potentially limiting the effectiveness of this therapy. Ionic bonding between positively charged anabolic growth factors and a negatively charged delivery vehicle could potentially result in sustained release

of these growth factors. The purpose of this study was to determine whether use of a negatively charged hydrogel would result in a more delayed elution of transforming growth factor-β1 (TGF-β1) from PRP. PRP was prepared from the blood of 9 dogs and split into two aliquots. One aliquot was activated with thrombin and calcium chloride and the other was combined with a negatively charged chondroitin-sulfate glycosaminoglycan (CS-GAG) hydrogel. The resulting gels were maintained in petri dishes for 13 days with eluent collected every 2 days. The concentration of TGF-β1 was quantified in each eluent sample using an ELISA, and differences between the two groups were assessed using a repeated measures ANOVA. The vast majority of TGF-β1 was eluted by day 5 from the thrombin gels whereas TGF-β1 elution from the CS-GAG hydrogels was more delayed. Significantly more TGF-β1 was eluted from the CS-GAG gels than standard PRP preparation for each sampling point between days 3 and 13 ($p<0.001$). The CS-GAG hydrogel resulted in a more sustained release of TGF-β1 than standard PRP preparation and further investigation of this delivery vehicle for clinical application is warranted.

Single Subunit Overexpression of NfnI in *Pyrococcus furiosus*

Leslie Adams, CURO Research Assistant
Dr. Mike Adams, Biochemistry and Molecular Biology, Franklin College of Arts and Sciences

The hyperthermophilic archaeon *Pyrococcus furiosus* contains two copies of genes that encode for the NADH-dependent Ferredoxin: NADP oxidoreductase I and II, referred to as NfnI and NfnII. NfnI is a two subunit enzyme recently characterized to be a bifurcating enzyme through its catalysis of the coupling of the oxidation of Fd and NADH to the reduction of NADP. However, NfnII, a highly similar enzyme to NfnI in regards to structure and spectroscopic properties, does not catalyze this same coupled reaction. To test whether NfnI and NfnII can form a chimeric protein, to obtain more in depth information on activity and redox properties of each subunit of NfnI, and to study the stabilities of the single subunits of NfnI, *P. Furiosus* strains were engineered to overexpress single subunits. Two of these strains, NfnI overexpression strains, are grown on a mass scale and are now being studied to determine their chimeric properties through gel filtration. Once the structure of the overexpression strains is determined, activity studies and assays will be performed to further study the overexpressed strains to give insight as to the specific kinetic and spectroscopic properties of each single subunit. The stability and interactions with Ferredoxin will be included in these ongoing studies as well to completely understand the properties of the NfnI enzyme and give insight as to why NfnII will not catalyze the same reactions despite having such a similar genetic makeup.

Attenuation of *Trypanosoma cruzi* by Fatty-Acid ß-Oxidation Monotetraallelic Knockouts

Nidhi Aggarwal, CURO Research Assistant
Dr. Rick Tarleton, Cellular Biology, Franklin College of Arts and Sciences

The hemoflagellate protozoan parasite *Trypanosoma cruzi* causes vector-borne Chagas disease, which is endemic to Central and South America as well as the southern United States, infecting >10 million individuals. Though it remains the greatest infection-based cause of heart disease, methods for diagnosing, treating and preventing *T. cruzi* infection remain ineffective. Our efforts to develop attenuated parasite lines for use in vaccination have been thwarted by technical and time-challenges of genetic manipulation of *T. cruzi*. However, recently developed CRISPR/Cas9-based methods now enable rapid gene knockouts (KO), insertional tagging, and whole genome library screens. The genes involved in fatty acid β-oxidation (FAO) in *T. cruzi* are essential; KO of both alleles of any of these genes in this diploid organism is lethal. However individual single allele KO of FAO genes attenuates parasite growth but is not lethal. To assure safety and to guard against reversion (i.e. future duplication of the remaining single allele), we propose to make multiple (up to 4) single-allele KOs in FAO genes in a single parasite line, using SaCas9 protein and specific gRNA complexes along with both serial and composite transfection strategies. Parasites with multigene KOs will be identified by monitoring gene tags inserted in the truncated gene. In addition to potential uses of these attenuated knockout lines for vaccine development, this research project is a functional application of

genome-editing tools in a high impact parasite that is both poverty driven and poverty promoting in the Americas.

Cemetery Records and the Spanish Flu in Athens, GA

Adwoa Agyepong
Dr. Susan Tanner, Anthropology, Franklin College of Arts and Sciences

Cemetery records hold unique insights to the past. They tell us more than who died; cemetery records can tell us the dates of birth, dates of death, as well as the gender of the dead. These records can give us demographic information for the cemetery and the local community, and can show us who is uniquely affected by certain diseases. This project will use cemetery records to better understand Georgia at the beginning of the 20th Century. I will focus on cemetery records from 1910 to 1920 in Athens-Clarke County, Georgia, and utilize public records, such as newspaper and public health records, for historical context. My primary goal is to compare demographic information from an Athens cemetery to records from similar cemeteries throughout the Southeastern US to assess if mortality patterns, including age at death are similar throughout the region. This project will also test for possible signatures of Influenza in the cemetery records. Newspaper accounts confirm the 1918 Influenza strain, otherwise known as the "Spanish Flu", was present in Georgia after October 1918. Previous research on the 1918 Influenza epidemic has documented that young adults were most vulnerable, with a peak of 28 years of age of death. I hypothesize that if the Spanish Flu had an effect, a rise in deaths will occur after October 1918, likely affecting young adults. This research will demonstrate how we can utilize cemetery records to better understand local history, including the health and lifeways of the community.

Microglia Activation in Rostral Nucleus Tractus Solitaries After Roux-en-Y Gastric Bypass Surgery

Mariam Ahmed, CURO Research Assistant
Dr. Krzysztof Czaja, Veterinary Biosciences and Diagnostic Imaging, College of Veterinary Medicine

One out of every 3 Americans suffers from obesity. According to the CDC, this number will only increase as the years progress, predicting that by the year 2030, 50% of Americans will be obese. An effective solution to attain long-term weight loss is Roux-en-Y gastric bypass (RYGB) surgery. During surgery, the vagus nerve is damaged, thus the brain communication with the gut is hindered. Previous research shows that innervation damage to the peripheral nervous system causes inflammation in the brain. The aim of this study was to understand these neuronal changes in the Nucleus tractus solitaries (NTS) 24-hours after RYGB surgery and 4 weeks after RYGB surgery. The experiment is conducted by collecting tissues from rats that have undergone RYGB surgery and those that had a sham surgery. The rats were perfused and their brains were dissected. The tissues were sectioned using a cryostat and stained using IBA1 antibody binding to activated microglia. Finally, microglia activation was analyzed in the stained tissues using the binary image analysis. The results of the study show that RYGB surgery is activating the microglia in the NTS both 24 hours and 4 weeks after surgery. In conclusion, RYGB surgery is altering gut-brain communication by inducing long-term inflammation in the NTS. This altered communication may be a key factor in the mechanism of reducing body weight post-surgery.

Sex-Trafficking in Georgia: Equipping Our Hotel Workers with the Proper Resources

Avni Ahuja, Foundation Fellow
Dr. Jody Clay-Warner, Sociology, Franklin College of Arts and Sciences

Human trafficking, referred to as "modern-day slavery," is a crime and a human rights violation. It is also the world's fastest growing criminal industry. The FBI ranks Atlanta as one of the top cities for child sex-trafficking, but this form of trafficking pervades almost every part of Georgia. Sex-trafficking, one of many forms of trafficking, is especially prevalent in hotels and motels. Traffickers and those purchasing sex capitalize on the privacy extended by lodging establishments and function with low risk of detection when staff and community members are unable to recognize signs of human trafficking. In this project, it is proposed that lodging establishments require their employees undergo training that teaches them to

recognize signs of sex-trafficking and report those signs to appropriate law enforcement agencies. Though the state of Georgia has taken many steps to counter sex-trafficking, many of these solutions are embedded within the justice system and seek to reform judicial process. While these solutions are important, more needs to be done on the forefront to identify victims and potential victims so that they can be removed from a dangerous situation and provided with restorative resources. Trafficking in lodging establishments presents a risk to the security of a hotel's business and its lawful hotel customers. Thus, the proposed policy benefits everyone in the state of Georgia. This project was completed by analyzing relevant research, legislation, and other government documents.

Studying Breast Cancer Metastasis to Bone Using Tissue Engineering

Jenna Evelynn Al-saleh, CURO Research Assistant
Dr. Cheryl Gomillion, Chemical, Materials, and Biomedical Engineering, College of Engineering

Breast cancer metastasis to bone can be detrimental for breast cancer patient outcomes. Currently, the mechanisms by which cancer is able to bypass bone tissue defenses, invade the tissue, and proliferate once settled in bone tissue sites are unknown. Many theories regarding chemical and signal cascades that allow for metastasis have surfaced; however, no clear cause has been identified. To develop more effective therapeutics, it is essential to understand this process. Tissue models of the microenvironments involved can help; several studies suggest that tissue stiffness has a direct correlation with breast cancer's ability to spread or metastasize. The objective of this work was to create an in vitro model of adipose tissue that mimics the breast tissue environment. Once a successful scaffold was created, we aimed to alter the stiffness of the scaffold to mimic native bone and study any resulting tumor cell changes. We prepared various percent solutions of low, medium and high molecular weight chitosan (1%-5% weight/volume), and hydrogel scaffolds were fabricated using chitosan cross-linked with sodium hydroxide. Scaffolds were characterized to evaluate the strength and storage modulus of the viscoelastic material to determine which solution best mimicked breast tissue's elastic modulus. Next, metastatic breast cancer cells were evaluated within the chitosan scaffolds to assess cell proliferation and signaling markers to determine if our model was feasible for further studies. Based on the research and results, we realized that further steps need to be taken to successfully study breast tissue stiffness and cancer metastasis.

College Students' Beliefs and Perceptions towards Nature and Campus Sustainability

Evan Alden
Dr. Jennifer Rice, Geography, Franklin College of Arts and Sciences

Our research on campus sustainability and the attitudes behind it aims to better understand the attitudes and beliefs behind the action or non-actions of students in the sustainability realm. We inquired, using a Qualtrics survey, into their personal actions, as well as their views and understandings of the actions for sustainability around them, whether this action is led by their peers or the university itself. We believe that the way students understand nature will affect the ideas they hold about their individual actions and therefore their ideas about sustainability and personal or large-scale involvement in sustainability efforts. After conducting our research, we connected the results back to this hypothesis and to social theory ideas such as social construction and neoliberalism. The results found that students who felt that their individual actions affected the environment were significantly more likely to attempt or adopt a lifestyle changes to benefit the environment, supporting our ideas about social (and therefore personal) construction of nature around us leading to the neoliberal trend towards individual action to benefit the environment. However, our results also supported that a significant portion of students tend to idealize nature, not bringing it into their personal realm and therefore not necessarily worrying about the effects of their actions.

Textiles and Fibers Single Point of Contact (SPOC)

Shelbi Aldrich, CURO Research Assistant
Dr. Suraj Sharma, Textiles and Merchandising, College of Family and Consumer Sciences

The goal of my research was to build an online textile database, or a Single Point of Contact, to be referenced by consumers and UGA Extension agents in the new Textiles division. The main research questions that I had to solve were, "What data should be included in the Single Point of Contact," and "What is the best way to organize the content online for both the consumer and the agent?" In order to address these questions, I did extensive research on textiles, garment quality and selection, and textile care through textile-related Extension files made available to me. Additionally, I worked with an IT professional to learn the best methods to use to turn my findings into an online database. The most logical place to develop the Single Point of Contact was on the pre-existing FACS Outreach web page, adding my research findings in a separate textiles section. The results are a fully-functioning web page for consumers to visit in order to find information on textiles, with a separate password protected portal providing information exclusively to UGA Extension Agents.

Comparing the AX3 and MetaSensor Accelerometers for Measuring Muscle Twitch

Rachel Aldridge, CURO Research Assistant
Nivita Sharma
Dr. Kevin McCully, Kinesiology, College of Education

Fatigability is an important characteristic of skeletal muscle, particularly in clinical populations. A clinically relevant endurance test has been developed that uses accelerometers to measure chances in muscle movement in response to electrically induced muscle twitches. We aimed to determine if transverse or parallel placement of the accelerometer on the muscle altered signal/noise ratios (s/n) and to compare the s/n of two triaxial accelerometers, each manufactured by a different company (MetaSensor and AX3). Twitch acceleration measurements were performed on the left vastus lateralis muscle of two able-bodied females. Electrical stimulation was performed using a medical grade electrical stimulator (Theratouch 4.7, Rich-Mar). The s/n was quantified by measuring the ratio between the vector amplitude of the first vibration of the muscle twitch and the peak to peak noise between muscle twitches. Transverse orientation of the AX3 and MetaSensor accelerometers yielded a 15% higher s/n ratio than the parallel orientation (transverse = 50.3, parallel = 36.6). Consequently, transverse orientation was used to compare s/n ratios between the accelerometers. The MetaSensor accelerometer (60.5) had a 50% larger signal to noise ratio than the AX3 accelerometer (29.9). Transverse orientation seemed to provide higher s/n ratios, even if the accelerometers are triaxial. The less expensive MetaSensor ($45 versus $200) may have better s/n ratios than the AX3. However, both accelerometers had adequate s/n ratio to perform measurements of muscle fatigability.

Archetypal Features of the Graphical User Interfaces of Electronic Medical Records and Their Cognitive Burden on Users

Eliza Ali, CURO Research Assistant
Dr. Dale E Green, Health Policy and Management, College of Public Health

This research examines common and arguably necessary attributes of electronic medical record (EMR) systems and the impact of their organization on end users. Specifically, this research will examine how to make the workflow of an ambulatory outpatient facility more efficient while optimizing quality. The specific groups of the workflow that will be analyzed are front desk staff, clinical support, and practitioners. The first part of the research involves designing a standard archetype of a graphical user interface of an EMR for each part of the chosen workflow in the form of a series of screens. EMRs are pervasively used in the United States today, and ill-designed EMR systems can cause issues with liability, privacy, and patient safety. Each health information system vendor designs their own user interfaces, often with staff from a technology background with little experience with or understanding of the health care system. Therefore, the second phase of research involves designing and administering an evaluation that will measure the cognitive burden the archetype has on volunteers that have used an EMR before. The evaluation will be in the form of a test in which each question will have a time limit. During the evaluation, an eye tracking tool will be used to monitor and later evaluate what the users' eyes are drawn to. Determining ways to alleviate

the cognitive burden of EMR systems on end users can provide insight to the creators of these systems and may lead to the development of more intuitive, safe and streamlined software.

Investigating Performance of *Agraulis vanillae* on *Passiflora incarnata*: A Geographic Mosaic Approach

Sehar Ali, CURO Research Assistant
Dr. Rodney Mauricio, Genetics, Franklin College of Arts and Sciences

Plant populations in different geographic locations are subject to interactions with multiple different herbivore species. These interactions can result in defense traits evolving in plant populations that are specific to the local herbivore community, which may ultimately result in differences in defense traits between plant populations across a large geographic distribution. This pattern is formally known as the geographic mosaic of coevolution hypothesis. One test of this hypothesis is to measure how interactions between plants from different populations affect herbivore performance with the assumption that herbivore species will perform differently on plants they are accustomed to (local populations) and ones they are naïve to (foreign populations). We tested this prediction by conducting two feeding experiments with *Agraulis vanillae* on *Passiflora incarnata* plants from different regions of the United States. We measured performance traits in *A. vanillae* including survival, development time, and pupation weight. We found that development time of *A. vanillae* did vary depending on which plant populations they fed on. This study provided another example of the incredibly intricate dynamics of the geographic mosaic of coevolution between plants and insect herbivores.

Development of Polymer-Based Microspheres for Drug and Supplement Delivery

Kirsten Allen, CURO Research Assistant
Dr. Karen J L Burg, Small Animal Medicine and Surgery, College of Veterinary Medicine

The development of polymer-based microspheres as a subset of novel drug delivery was investigated. These spherical beads have the potential to hold and release certain drugs such as various proteins and fatty acids. Within a specific environment in the body and at a set point in time, microspheres are degradable and will release their content. This allows for a controlled release of the drug at the target site of the body. To facilitate bead development, a sample drug, such as bovine serum albumin (BSA), or gelatin, can be encapsulated in microspheres composed of polylactide (PL) using poly-vinyl alcohol (PVA). Microspheres can be prepared using a single emulsion, solvent evaporation method. In this work, polymeric microspheres of varying BSA and gelatin concentrations were created to characterize their dimensions and thermal properties. The BSA and gelatin encapsulated microspheres were also quantified for their encapsulation efficiency using a BCA assay and a hydroxyproline assay respectively. Current work involves the encapsulation of fatty acids, like linoleic acid, within polylmeric microspheres to serve as a protective transport system in ruminant digestion. These lipid encapsulated microspheres will be characterized using microscopy, compression testing, differential scanning calorimetry, and biodegradability testing to measure encapsulation efficiency. The linoleic acid encapsulated micropsheres will be optimized to support ruminant nutrition and health.

Geography of Kurdistan

Bilind Amedi
Dr. Amy Ross, Geography, Franklin College of Arts and Sciences

In international affairs today, the region known as Kurdistan is vitally important. It is located in Syria, Turkey, Iran, and Iraq. The United States (US) is currently engaged in a battle with ISIS in the air while the Kurdish army has boots on the ground fighting. How important is the US relationship with the Kurdish people? Can the US ally with the Kurdish people, and if so, what might be the affects on the US relationships with Turkey, Syria, Iran and Iraq? The US has had a big impact on Kurdistan dating back to Saddam Hussein's regime and the Iraq wars. In addition, Kurdistan has its own issues, such as statelessness, corruption, and persistent persecution. In my research, I seek to learn from the history and geography of Kurdistan, in relation to the Middle East and the US. This preliminary study of the

geography and international relations of Kurdistan will help me develop my research objectives for a future field-based study in Kurdistan.

Chemical Weapons and the Legacy of War

Ali Elizabeth Anderson, CURO Honors Scholar, CURO Research Assistant
Dr. James W Porter, Ecology, Odum School of Ecology

Between 1940 and 1970, more than one million metric tons of chemical weapons were dumped into the world's oceans. As the official policy of disposal, this method has resulted in decades of environmental damage and put people at risk. Even three-quarters of a century after the end of WWII, coastal zone communities around the globe still encounter these toxic munitions. While scientists and policymakers have worked to quantify and address the hazards of chemical weapons in the Baltic Sea and several other European waterways, this study focuses on the location and quantity of chemical weapons dumped in the tropical Pacific, where these weapons were stockpiled as the United States advanced toward Japan in the closing years of the war. This study will assess the impact of chemical weapons on economic development on several islands, policies regarding chemical weapons, and examine the limitations of the Organization for the Prohibition of Chemical Weapons to address these problems. The study was conducted via the collection and analysis of primary and secondary documents from a variety of sources, including historical data, maps, government reports, and scientific articles. While the war is long over, the toxic legacy of these weapons lingers both in the ocean and on adjacent lands. The challenge to find, retrieve, and destroy them remains.

Controlled Linoleic Acid Release in a Hydrogel-Based Mammary Adipose Tissue Model

Kerri Andre, Foundation Fellow, CURO Research Assistant
Dr. Cheryl Gomillion, Chemical, Materials, and Biomedical Engineering, College of Engineering

The female breast is largely comprised of fat, or adipose tissue. There is evidence that adipose tissue-related factors, such as fatty acids, affect cancer cell growth and spreading to other tissues; however, these mechanisms are not clearly understood. We aim to develop a hydrogel-based in vitro model system, mimicking the mammary adipose tissue microenvironment, to study the effects of fatty acids, such as linoleic acid (LA), on breast tumor cell behavior. Chitosan is a favorable biopolymer choice for this model because of its many excellent properties, including being antimicrobial, biodegradable, and biocompatible, in addition to its crosslinking ability. Thus, chitosan microspheres (beads) were used to yield controlled, timed, and steady release of fatty acid to more closely mimic the in vivo environment found in breast tissue. A preliminary two-dimensional (2D) study of breast cancer cells treated with either high or low doses of LA showed that both doses resulted in a negative effect on cell metabolic activity over the course of seven days, suggesting that lower level, slower release would be more optimal for our model. In a follow-up study, the controlled release of LA from chitosan bead models was successfully documented over the course of ten days, suggesting that chitosan beads can be utilized to create a mammary adipose tissue model for studying breast cancer cell behavior. Interaction of breast cells with the fatty acid-loaded beads will be evaluated with future work to further demonstrate the feasibility of this model.

Family Functioning and Health-Related Quality of Life in Adolescent and Young Adult Transplant Recipients

Lauren Ellis Arnold
Dr. Ronald L Blount, Psychology, Franklin College of Arts and Sciences

This work aims to determine the impact of family functioning in relation to health related quality of life (HRQOL) for adolescent and young adult (AYA) solid organ transplant recipients. HRQOL in this population is significantly lower than that of the general population. The purpose of this project is to examine if family functioning within the AYA solid organ transplant recipient population impacts HRQOL. Participants include 64 liver, heart, or kidney recipients ages ranging from 12-21 years (Mage=16.91 years, SD=2.03) and their caregivers (N=64). Caregivers completed measures of family adaptability and cohesion, and AYA HRQOL. AYAs completed self-report

measures of HRQOL. AYA-self and caregiver-proxy-reports on HRQOL in relation to family function were related to one another ($r=.58, p<.01$). Caregiver-reported family cohesion and flexibility were positively associated with caregiver reported HRQOL (both $r=.35, p<.01$). Family flexibility was also correlated with AYA self-reported HRQOL ($r=.29, p<.023$). Family functioning is significantly related with AYA HRQOL. Better family functioning for these individuals is associated with HRQOL. Intervention efforts to improve family cohesion and flexibility may result in improved HRQOL for AYA solid organ transplant recipients.

The Effects of Phthalate Exposure in Female Germ Cells

Gazal Arora, CURO Research Assistant
Dr. Maria M Viveiros, Physiology and Pharmacology, College of Veterinary Medicine

Errors in meiotic division can lead to aneuploidy, which is a major cause of pregnancy loss and congenital disorders such as Down syndrome. Studies indicate that exposure to environmental toxins can disrupt reproductive function, including meiotic division in female germ cells (oocytes). An increasingly prevalent group of environmental toxicants includes phthalates, used to soften and increase the flexibility of plastics, which are considered endocrine disrupting chemicals. The objective of this study was to test the effects of di (2-ethylhexyl) phthalate (DEHP), a commonly used phthalate, on meiotic division in mouse oocytes. Cumulus-enclosed oocyte complexes (COCs) were collected from the ovaries of PMSG-treated female mice and cultured for 17 hours with increasing DEHP concentrations (0, 1, 10, 100 μg/ml). The oocytes were then fixed for immunofluorescence analysis. The spindle microtubules and the microtubule organizing centers (MTOCs) were labeled with anti-acetylated tubulin and pericentrin antibodies, respectively, and the chromosomes detected with DAPI. All oocytes were analyzed using an upright fluorescent microscope and imaging software. The rate of oocyte maturation to metaphase-II (MII) and incidence of chromosome misalignment did not differ significantly with increasing DEHP exposure. However, direct measurements revealed a disruption in meiotic spindle organization in response to DEHP, particularly in metaphase-II (MII) stage oocytes. The MII spindles were characterized by reduced spindle length and less focused (broader) spindle poles. These data indicate that DEHP can disrupt meiotic spindle organization, which is necessary for accurate chromosome segregation.

Insect Resistance Characterization of *IRP9* in Soybean

Praharshak Asireddy, CURO Research Assistant
Dr. Wayne Parrott, Crop and Soil Sciences, College of Agricultural and Environmental Sciences

Salicylic acid (SA) is an important signaling chemical in plants, most notably acting as a hormone for pathogen resistance. The *IRP9* gene is a SA synthase gene from the bacterium, *Yersinia enterocolitica*. When introduced into plants, *IRP9* increases SA production, leading to improved pathogen resistance. However, SA can have an antagonistic relationship with jasmonic acid (JA), which is vital to a plant's insect resistance. In particular, increasing SA levels in soybean, *Glycine max*, is of agronomic interest to obtain increased pathogen resistance, but due to the antagonistic nature of SA and JA synthesis, the plant's resistance to insects could possibly worsen as SA production increases. Therefore, four lines of soybean with the *IRP9* gene engineered into them will be tested for insect resistance. These lines show increased SA levels ranging from 2 to 14 times higher than normal, and will be tested for resistance to the soybean looper (*Chrysodeixis includens*), by determining if the plants can inhibit growth of caterpillars feeding on them for 14 days. The usefulness of this gene for agriculture will be determined by the extent to which it affects insect resistance.

Changes in Distribution of Black-Bellied Whistling Ducks (*Dendrocygna autumnalis*) in the Southern Atlantic Flyway

Samantha Askin, CURO Research Assistant
Dr. Michael Chamberlain, Forestry, Warnell School of Forestry and Natural Resources

Whistling ducks have been reported in Florida, South Carolina, and Georgia. To date, there have been no studies evaluating distribution of

whistling ducks throughout the southern Atlantic Flyway, or the potential for an expanded geographic range. My objectives were to describe and map changes in distribution of whistling ducks through the southern Atlantic Flyway, determine potential movement routes, and identify potential factors influencing expanded distribution. State agencies provided banding and recovery data sets from 2006 - 2016. Citizen scientist data from 2006 - 2016 from eBird.org and the Cornell Ornithological Laboratory was also used. I used ArcGIS v. 10.4 to create maps that represented location and potential movement routes, providing a unique way to visualize change in their distribution. I used these maps to identify potential movement routes and geographic distribution of whistling ducks. 109 counties had sightings of whistling ducks during 2006-2016; Florida had the most rapid expansion, followed by Georgia and South Carolina. The birds in the southern Atlantic flyway are migrating north to south, rather than east to west. Future work could expand this research to look at the genetics of birds in the southern Atlantic flyway to identify where they are originally from. My overall suggestion would be to use results collected from this research to propose new management strategies for Black-bellied whistling ducks in the southern Atlantic flyway.

Multimerization of Long DNA Inserts via Bombardment

Brooke Aspinwall, CURO Research Assistant
Dr. Kelly Dawe, Genetics, Franklin College of Arts and Sciences

To transform plants, transgenes are often introduced using *Agrobacterium* because of the stability of insertion. Gene inserts from *Agrobacterium* are limited to about 30kb in size. Transformation via particle bombardment, or biolistic transformation, can insert larger DNA constructs than *Agrobacterium*, but it is less stable and has lower gene expression than *Agrobacterium* transformation. DNA inserted with biolistic transformation is thought to have more rearrangement, but it has never been definitively proven. Bombardment is used to transform a wide variety of plants and can use DNA in a range of forms to insert genetic constructs. Still, there are many unanswered questions associated with biolistic transformation, such as how large of a construct can be inserted, if rearrangement occurs, and if DNA pieces could be inserted and assembled into a larger construct. To test these questions, rice and maize were biolistically transformed with lambda DNA, which has sticky ends that are capable of joining together. Whole-genome sequencing will be used to figure out where the DNA was inserted, if the DNA joined together, and if rearrangements occurred.

Mechanistic Relationships Between Mga and Myc During Zebrafish Development

Adam Greg Aston
Dr. Scott Dougan, Cellular Biology, Franklin College of Arts and Sciences

This study focuses on the normal interactions of MAX Gene Associated (MGA) transcription factor and Myc during zebrafish development as well as its possible role in tumorigenesis. The *mga* gene encodes a transcription factor with two DNA binding domains conserved in humans, mice, and zebrafish, and is involved in cell cycle regulation and differentiation. In vitro, Mga antagonizes Myc, an oncogene previously well-studied. There is no current evidence documenting the relationship between Mga and Myc in vivo. To study the transcriptional activity of Mga in zebrafish, the morpholino system is utilized to knock down Mga. A morpholino is an oligonucleotide that binds to specific mRNA sequences and blocks their translation or splicing resulting in reduction of expression of their protein products. Injection of *mga* morpholinos in embryos can yield phenotypes including a wide array of defects in neural crest development and organogenesis. Given that Mych, a c-Myc homolog in zebrafish, is reported to be involved in neural crest formation, we used a reporter construct to determine if the morphant phenotype is due to the antagonistic role of Mga. The reporter construct contains a luciferase gene under the control of a minimal promoter and four E-boxes. By analyzing the reporter gene expression, the results should allow for a better understanding of Mga and Myc interaction in vivo during embryonic development and in human cancer.

The Effect of Age on Functional Connectivity of Cognitive Control Networks in People with Schizophrenia

Emma Auger, CURO Research Assistant
Dr. Jennifer McDowell, Psychology, Franklin College of Arts and Sciences

The integrity of cognitive control (CC) is related to the functional connectivity of brain networks as assessed by resting-state functional magnetic resonance imaging (rsfMRI). Good CC is associated with strong within network connections, like those in the executive control network (ECN, composed of frontal-parietal regions and recruited during CC); and strong differentiation between networks, like between the ECN and the default mode network (DMN, composed of midline regions and suppressed during CC). Resting-state networks change over the lifespan in healthy individuals and reflect changes in CC. People with schizophrenia experience CC deficits and disrupted brain connectivity of both networks in early and mid-adulthood. While there is some evidence that schizophrenia may be a neurodegenerative disorder, it is uncertain if age-related connectivity changes are similar between schizophrenia and healthy comparisons, especially when healthy comparisons have similar cognitive deficits (low cognitive control, LCC). In this study, people with schizophrenia (n=28) and healthy comparisons with LCC (n=28) will complete a resting-state scan. Each group will be further subdivided by age: younger individuals (20-35 years) and older individuals (44-63 years). To quantify the effect of age on CC network connectivities and how they might be different across the two groups, we will perform a group by age ANOVA on functional connectivity of the DMN and ECN. We hypothesize that older individuals will have less network connectivity compared to younger individuals. Using the neurodegenerative theory of schizophrenia, we anticipate this difference to be larger in people with schizophrenia.

Punitive or Positive: How University Affirmative Consent Policies Can Be Framed for Maximum Effect

Prentiss Rachel Autry, CURO Research Assistant
Dr. Justine Tinkler, Sociology, Franklin College of Arts and Sciences

While many college campuses have recently changed their sexual misconduct policies, there has been little consistency in the framing of these statements. This study, conducted through the Laboratory for the Study of Social Interaction, seeks to determine how university policies can best be presented to affect the most social change. Participants in this study are undergraduate students, given one of four randomly assigned policy statements and then asked to answer questions assessing their memory and understanding. The study has been pilot tested and researchers are currently collecting data. The findings of this study could have direct impact on university policy framing and will shed light on how policies impact cultural beliefs and behavior.

Chondroitin Sulfate Glycosaminoglycan Matrices Promote Neuroprotection Sub-Acutely Post-Traumatic Brain Injury

Nivedha Balaji
Dr. Lohitash Karumbaiah, Animal and Dairy Science, College of Agricultural and Environmental Sciences

A traumatic brain injury (TBI) is defined as a penetrating wound to one's head that affects brain function. In the United States, an estimate of 2.4 million illnesses and deaths each year can be traced back to TBIs. There are two distinct periods in TBI: primary and secondary. The primary injury results from the initial force, causing tissue shearing and compression. The secondary injury results as a consequence of the primary injury and causes further tissue loss. Currently there are no effective treatments for the secondary loss of tissue post-TBI. We hypothesized that chondroitin sulfate glycosaminoglycan (CS-GAG) matrices or CS-GAG matrices along with rat PKH26GL labeled allogeneic neural stem cells (NSCs) help facilitate tissue repair. The treatments were delivered intracortically 4 weeks post-TBI. A histological analysis was conducted to demonstrate differences between treated and control groups. Nissl staining showed CS-GAG treated animals demonstrated enhanced neuroprotection ($p<0.05$) when compared to controls and NSC-only treated animals. Sox-1 and Ki67 staining indicated enhanced proliferation and maintenance of undifferentiated ($p<0.05$) NSCs in the CS-GAG-NSC treated rats. There was high retention of FGF-2 ($p<0.05$) in CS-GAG and CS-GAG-NSC treated animals. There was enhanced presence of

CD68+ macrophages ($p<0.05$) in animals treated with NSC only and CS-GAG-NSC. All treatment and SHAM control groups illustrated weakened presence of GFAP+ reactive astrocyte ($p<0.05$) in the lesion site when compared to TBI controls. These observations provide further evidence for the potential application of CS-GAGs as neuroprotective agents post-TBI.

Revising the Classics: Modern and Contemporary Female Authorial Treatment of Unactualized Characters from Greek Myth

Manisha Banga
Dr. Benjamin M Wolkow, Classics, Franklin College of Arts and Sciences

This work analyzes contemporary female authors' use of ancient Greek and Roman myth in their writing. The research is in two parts, where Part I analyzes authorial reinterpretation of marginalized characters from ancient myth and Part II analyzes authorial reinterpretation of heroes from ancient myth. Where female authors generally attempt to provide newfound voice and sympathy for ancient characters, a more complex process occurs in reinterpretations of heroes. In one method, contemporary female authors villainize ancient heroes as a mode of catalyzing sympathy for marginalized characters who are abused by heroes. In the second method, authors feminize ancient Greek heroes. By feminizing traditionally hypermasculine heroes, female authors reverse traditional norms and thereby engage in feminist revisionism. I analyze works from a diverse array of contemporary female authors, including Margaret Atwood, Anne Carson, Sarah Ruhl, Madeline Miller, and H.D.

Depletion of a Key Maternal Protein Impairs Early Embryonic Development

Wendi Bao
Dr. Maria M Viveiros, Physiology and Pharmacology, College of Veterinary Medicine

Aneuploidy in embryos is a major cause of congenital disorders as well as pregnancy loss, and is attributed to error-prone meiotic division in oocytes. The accuracy of chromosome segregation is dependent on stable spindle formation, which is regulated by unique acentriolar microtubule organizing centers (aMTOCs) in oocytes. To test aMTOC function we developed a unique transgenic (Tg) mouse model in which a key protein, Pericentrin (Pcnt), was knocked down exclusively in oocytes. We previously demonstrated that oocyte-specific loss of Pcnt in Tg mice disrupts spindle organization, leading to highly error-prone meiotic division and significant female subfertility. The current study assessed the basis of embryonic loss in Tg mice lacking maternal Pcnt. Ovulated metaphase-II oocytes were collected from control (WT) and Tg females and in vitro fertilized with control sperm. Presumptive zygotes were fixed for immunofluorescence analysis at 24 hour intervals post-fertilization to evaluate the development of pre-implantation stage embryos. While loss of maternal Pcnt delayed the first mitotic division, there was no significant difference between the WT and Tg groups in the overall 2-cell cleavage rates by 24 hours post-fertilization. Similar rates of embryos also developed to the morula and blastocyst stages. However, blastocysts derived from Pcnt-depleted oocytes showed an increased incidence of mitotic errors, and contained significantly fewer total cell numbers, attributed to a pronounced decrease in trophectoderm lineage cells specifically. These data demonstrate that ablation of maternal Pcnt disrupts early embryonic quality, which likely contributes to lower fertility in Tg females.

Organic Fertilizer Improves Revegetation of Roadside Soils

Evan Barnard, Ramsey Scholar
Dr. Nina Wurzburger, Ecology, Odum School of Ecology

Urbanization and road construction affect the global carbon cycle by releasing carbon from soil and reducing carbon inputs into soil from plant productivity. Revegetation of areas disturbed by construction can replenish soil organic matter, thereby increasing plant productivity and soil carbon storage. Plant restoration of disturbed roadsides can be facilitated by the application of fertilizers. However, fertilizers (i.e., organic or inorganic) vary in their effectiveness and carbon footprint. We conducted a plant growth experiment using *Elymus virginicus* and soils sampled along roads in Atlanta, GA to investigate how fertilizer treatments affect plant growth. We

performed a two-way factorial experiment, with two factors (inorganic or organic fertilizers), each with two levels (with or without), crossed to create four experimental treatments. We hypothesized that both inorganic and organic fertilizers would increase plant growth, but that plants grown with organic fertilizer would produce more biomass compared to those receiving inorganic fertilizer. Following twelve weeks of growth, we quantified plant growth, root:shoot ratios, soil microbial biomass, and soil nutrient and pH pools. We found that both inorganic and organic fertilizers increased plant biomass and decreased the root:shoot ratio, and addition of organic fertilizer increased plant biomass more than the addition of inorganic fertilizer. Our findings suggest the addition of organic fertilizer as an effective management tool for revegetating disturbed roadsides, promoting greater carbon sequestration in urbanized areas and counteracting the rise in atmospheric greenhouse gases.

Nutrition of Women and Adolescent Girls in Conflict Zones

McKenna Barney, Foundation Fellow
Dr. Maria Navarro, Agricultural Leadership, Education, and Communication, College of Agricultural and Environmental Sciences

This study focuses on the effects of malnutrition on women and children in conflict zones in developing countries and the efforts taken by governmental and non-governmental organizations to improve the health of these vulnerable community members. I used a meta-analysis of case studies completed on malnutrition in conflict zones including Chiapas, Afghanistan, Syria, and others to look for common causes and complications that could provide insight into how to better fight malnutrition in these areas. I also explore successful and unsuccessful attempts to assuage malnutrition in conflict zones and the reasons behind their relative impacts. By analyzing programs implemented by both governments and non-governmental organizations, this research can help to identify recurring problems with planning and implementation of nutrition promotion in regions plagued by conflict. Based on an extensive literature review, this research found that conflict exacerbates the issue of malnutrition due to disruptions in the food supply, economic instability, poor sanitation, safety concerns, and inadequate government services. On an individual level, exposure to trauma can interfere with breastfeeding among mothers and proper caloric intake among children. This study demonstrates that malnutrition in conflict zones is not simply caused by lack of food availability or improper utilization, and highlights key challenges development organizations experience when working to ensure food security.

The Financial Obligations of Owning a Pet

Ellen Barrow, CURO Research Assistant
Dr. Brenda Cude, Housing and Consumer Economics, College of Family and Consumer Sciences

This study was undertaken to discover the average financial obligations of owning a pet, especially for students in college. Specifically, we hoped to discover what pet related expenses are most common outside of regular expenses such as food and basic care. I wanted to explore the topic of pet insurance and whether students may find this service useful, as well as what plans are offered. To get a sense of what information would be relevant in analyzing these problems, informational interviews were conducted with students and other pet owners. The results were used to help formulate the questions we wanted to ask in our survey. Currently, the survey is planned to ask students and pet owners about their average expenses, un-planned expenses, and the costs and benefits of owning a pet. I have reached out to local veterinarians' offices to get their help to gain survey participants. After the survey results are available, I will analyze the benefits that having pet insurance provides compared to the average costs that pet insurance would cover. I will then use the data to make recommendations to students on whether pet insurance would be a beneficial endeavor. Finally, I hope to provide an average cost and time commitment in relation to pets to help better prepare future pet owners for their responsibilities.

Examination of Courtship Songs across *Drosophila subquinaria* Populations

Sophie Alexandra Barton
Dr. Kelly Dyer, Genetics, Franklin College of Arts and Sciences

The *Drosophila* genus is famous for its elaborate courtship behaviors that vary between species, populations, and individuals. Male fruit flies use a multitude of sensory signals to court a female, including pheromones, tapping, licking, and wing vibrations. Wing vibrations, which produce songs, are of particular interest, as they have been found to be acted upon by sexual selection and vary greatly between species. There are two major categories of song types produced by *Drosophila* flies—the sine song and the pulse song. The sine song is a continuous "humming" song that often comes before or after the more prominent pulse song. As its name suggests, a pulse song consists of a string of pulse sounds called a "burst." Many studies focus on the interpulse interval (IPI) between bursts because they are unique to each species and contribute to species recognition. *D. subquinaria*, a species whose songs have not been studied extensively, has been found to produce only pulse songs, which vary greatly between populations. In populations that are sympatric with the recently diverged *D. recens*, *D. subquinaria* females discriminate against conspecifics from other populations. This discrimination is likely in part due to fundamental song difference between populations. The present study sought to determine what differences in the characteristic songs of sympatric *D. subquinaia* and two other allopatric *D. Subquinaria* populations might be used as cues for discrimination. We recorded courtship songs of the three populations for analysis. It is expected that IPI will differ greatly across populations.

Unfamiliar Stone Hammer Use in Juvenile Bearded Capuchin Monkeys

Sophie Alexandra Barton
Sreinick Keo, Rushi Ketan Patel
Dr. Dorothy Fragaszy, Psychology, Franklin College of Arts and Sciences

Wild bearded capuchin monkeys in Fazenda Boa Vista, Piauí, Brazil regularly use stone tools to crack open nuts. They place nuts in shallow pits on anvil surfaces, which they strike with a hammer stone. Adults must accumulate years of experience to become efficient nut crackers—it takes more than six years for juveniles to become proficient. The monkeys use exploratory actions prior to striking the nut, such as flipping the stone and knocking the nut. Capuchin monkeys show individual variability in hand positions on the stone during the lifting and striking with the stone. The present study seeks to determine how the exploratory actions, stone grips, and strike success of juvenile capuchin monkeys differ from those of adults. Videos of individual monkeys cracking nuts using an unfamiliar stone at the field site in Brazil were coded for the first 20 strikes. We expect that juvenile monkeys use a more diverse set of exploratory actions, use more variable and inefficient stone grips, and have less striking success than adults, due to their smaller size and inexperience. Preliminary data suggests that juveniles are less consistent in stone hand positioning, use exploratory stone flipping actions more often, and frequently try to crack two nuts at once, which leads to lesser striking success. These and subsequent findings will provide insight into the development of stone tool use behavior of these monkeys and other species, including extinct hominins.

Obstructed Labor: Analyzing Realistic Implementations for Developing Countries to Decrease Maternal Morbidity

Hannah Bass, CURO Research Assistant
Dr. Trina Salm Ward, Health Promotion and Behavior, College of Public Health

Obstructed labor is one of the leading causes of preventable maternal death in underdeveloped countries. This mechanical problem occurs when the head of the fetus cannot fit through the mother's pelvis during child birth, even when healthy contractions are present. Cases of obstructed labor can be easily overlooked, especially since there are not definitive indicators for mothers at risk. Timely diagnosis is crucial for the heath of both the mother and child; however, there are several delays specific to developing countries that hinder a mother from obtaining the proper treatment in time. Once the obstructed labor is recognized, the mother can undergo cesarean section, have an assisted vaginal delivery, or undergo a symphysiotomy. The goal of my research is to understand risk factors and prevention of obstructed labor, as well as the best practices and treatment that could be realistically implemented in developing countries. I searched peer-reviewed articles between the years 2000 and 2017 that describe solutions for decreasing the chance of maternal morbidity due to obstructed

labor. I compiled article information and will synthesize literature results. This research will lead into a plan for deciding on the most effective practices and treatments, as well as areas for future work and improvements with regard to the available resources in underdeveloped countries.

Psychosocial Functioning and Barriers to Medication Adherence in Adolescents Awaiting Solid Organ Transplants

Haley Bearden, CURO Research Assistant
Dr. Ronald L Blount, Psychology, Franklin College of Arts and Sciences

Medication adherence is a significant concern for solid organ transplant candidates, parents and healthcare providers. Barriers to medication adherence have been related to treatment barriers (e.g., hospitalization, rejection episodes, and death) and internalizing symptoms in children and adolescents who have received solid organ transplants. Little research has been done to explore the association between medication adherence and psychosocial functioning (e.g., anxiety, depression, and attention problems) among adolescent patients before they receive their transplant. The purpose of this study is to examine medication adherence and psychosocial functioning among pediatric candidates awaiting solid organ transplants in order to prevent treatment barriers. The population includes 35 adolescents ranging from ages 12-20 (M= 15.99, SD= 2.35) awaiting solid organ transplants (54.3% kidney, 22.9% liver, and 22.9% heart). Participants were recruited at the Transplant Services Clinic at Children's Healthcare of Atlanta. Participants completed self-report measures on psychosocial functioning and barriers to adherence using paper-and-pencil measures while at their pre-transplantation evaluation appointment. Total barriers to medical adherence were positively correlated with attention problems ($r=.34$, $p=.05$) and depression ($r=.56$, $p<.001$). Correlations between barriers and anxiety and hyperactivity were not significant. Significant between-organ group differences in barriers to adherence were also found between kidney recipients (M=44.10, SD=36.75) and heart recipients (M=31.88, SD=39.63). Identifying the significant relationship between psychosocial functioning and barriers to medication can help prevent treatment barriers and improve the health of adolescents awaiting transplantation.

Two-Point Threshold as a Measure of Hyperacuity and Intraocular Scatter

Jacob Beckham, CURO Research Assistant
Dr. Lisa Renzi Hammond, Psychology, Franklin College of Arts and Sciences

Intraocular scatter from anterior optics and subsequent glare is one of the more prevalent forms of visual disturbance in adults and is a significant cause of automobile accidents in the US. This scatter forms a normally distributed intensity curve (the point-spread function), which can be measured. For example, two point sources of light produce two incident rays whose intensity curves may overlap, causing a subject to only perceive one light source (the Rayleigh criterion). The purpose of this experiment is to establish this two-point threshold as a measure of hyperacuity related to intraocular scatter, and to determine the contribution of both wavelength and intensity to that scatter. Emmetropic (20:20 uncorrected, Snellen notation) participants were recruited from the UGA student population. Two-point thresholds were determined using a broadband xenon light source, presented as two independent points whose distances from each other could be adjusted. Intensity of the source was varied during testing, and narrow-band interference filters were used to change the chromatic content of the stimulus. It is anticipated that two-point threshold distances and light intensity levels are inversely related due to increased levels of intraocular scatter at high luminance levels. These results will be used to inform the testing of novel contact lens technology, which may absorb the wavelengths of light most prone to scatter.

Optimized Enzyme-Linked Immunosorbent Assay to Assess Anti-Neuraminidase Response in Human Sera

Anne Kathryne Belocura
Dr. Ted M Ross, Infectious Diseases, College of Veterinary Medicine

Influenza virus is the causative agent of a febrile respiratory disease called influenza, or "flu," which can cause serious illnesses and death. The virus expresses two antigens on its surface,

haemagglutinin (HA) and neuraminidase (NA), which play essential roles in the budding and spreading of the agent. Current seasonal vaccines must be updated annually and protect poorly against antigenic drift variants, driving the search for improvements on the vaccine to ensure a broader protection. Flu vaccines have been developed to work against only HA, but NA has never been standardized for a vaccine. The goal of this experiment is to assess whether the current vaccine elicits antibodies against neuraminidase in an enzyme-linked immunosorbent assay (ELISA). We used virus-like particles (VLP) as an alternative influenza NA. For this experiment, sera from human cohorts vaccinated with A/California/7/2009 (H1N1)pdm-09-like virus and A/Hong Kong/4801/2014 (H3N2)-like virus were obtained day of vaccination (d0) and 21 days post-vaccination (d21). Sera were then incubated against VLP to test whether or not elicited antibodies recognized the expressed antigen and to assess antibody titer between d0 and d21. ELISAs have been tested on A/Switzerland/9715293/2013 NA VLP, A/Wisconsin/67/2005 NA VLP, and A/Panama/2007/1999 NA VLP.

Design and Development of Bioengineered 3D Scaffold Using Novel Biomaterials for Tissue Regeneration Cell Culture

Wilfred Oluwafemi Benard, CURO Research Assistant
Dr. Jaya Sundaram, Chemical, Materials, and Biomedical Engineering, College of Engineering

Extensive research has been conducted to determine a suitable material to promote new bone formation in clinical orthopedics. The biomaterials must be biodegradable, biocompatible, and bio-tolerable. This research focuses on the advantages of nanocellulose, such as mechanical reinforcement, surface chemical reactivity, biocompatibility, lack of toxicity, and high specific surface area. The structural advantages of nanocellulose are suitable for the production of a 3D cellular tissue scaffold material for bone tissue regeneration. Hydroxyapatite (HA) is an osteo-conductive material that stimulates muscle on bone fixation and enhances material rigidity, these two biomaterials (nanocellulose and hydroxyapatite) were combined to produce a suitable scaffold. In addition to nanocellulose and HA, alginate, a hydrogel biomaterial was used to give structural stability to the scaffold during development. We varied the concentration of each biomaterial to come up with the best possible scaffold support structure for tissue regeneration. Developed scaffolds were tested to analyze morphological characteristics, biochemical characteristics, and mechanical strength by measuring compressibility, swelling ratio, in vitro degradation analysis, and in vitro cell culture analysis. The nanocellulose is expected to have better cell matrix adhesion, cell differentiation and guided tissue regeneration.

How Social Media Affects Higher Learning

Anna Bennett, CURO Research Assistant
Dr. Lilia R Gomez-Lanier, Textiles and Merchandising, College of Family and Consumer Sciences

Today's higher education classroom setting is unlike it was a decade ago. The availability of smartphones, laptops, and tablets has increased considerably, and with them the ease of access to social media and various other applications. Most research regarding the impact of technology on learning has been focused on K-12 classrooms while only a small percentage has been conducted within the higher education community. Specific studies on Facebook use in college classrooms have been done, but beyond that, a minimal amount has been discovered on which social media and/or applications are currently being used to enhance the learning experience in today's college classrooms. The goal of this research is to determine which social media sites and/or applications are being used for educational purposes in higher education. Quantitative data will be collected through the use of an online survey host and will be taken from undergraduate and graduate students within the College of Family and Consumer Sciences at the University of Georgia. The findings will assist in discerning which applications and social media are being used most for learning, inside and outside of the classroom. They will also show student's personal preferences, based on gender and academic level, in utilizing these programs, as well as their overall preferences for these learning outlets. This information will assist educators in the decision of

incorporating social media into the learning environment, and if so, in what capacity, to enhance student learning.

Gold Nanoparticles, Cytotoxicity and Radiosensitization in a Feline Vaccine-Associated Sarcoma Cell Line, In Vitro

John Zachary Benton
Dr. Robert M Gogal, Veterinary Biosciences and Diagnostic Imaging, College of Veterinary Medicine

Vaccine Associated Sarcomas (VAS) are highly invasive feline malignant tumors that are frequently associated with routine vaccination. Current treatment modalities include chemotherapy, radiation, and radical surgery. VAS have been shown to be one of the more resistant of feline cancers to conventional therapy, with high rates of recurrence. Previous studies have shown that gold and other high atomic number nanoparticles have the ability to increase the dose of radiation deposited into tissue by generating secondary electrons. The current study evaluated the effects of 15 nm gold nanoparticles (AuNP) on VAS cells alone and when combined with electron beam radiation. Cells from an established VAS cell line were co-cultured with AuNp at 0, 0.25, 0.5, 1.0, 2.0 and 4.0 mM. Cytotoxicity of AuNP was evaluated by assessing changes in cellularity, cell proliferation, cell cycle and viability/cell death with the radiosensitizing potential of AuNP on VAS cells assessed by the clonogenic assay. AuNP, regardless of concentration, had a negligible effect on cellular proliferation, cell viability, cell cycle, and cell death. AuNP alone decreased colony formation in a dose dependent manor; colony formation was further suppressed when combined with radiation. Preliminary results indicate that 15 nm AuNp at less than 4.0 mM does not appear to be cytotoxic, but upon uptake within the VAS cell and irradiated does significantly impair colony formation. This would suggest that pretreatment of VAS cells with AuNP can enhance the efficacy of radiation therapy and thus have some level of therapeutic application.

Motown Styles and the 1960's American Dream

Oloni Binns, CURO Research Assistant
Dr. Monica Sklar, Textiles and Merchandising, College of Family and Consumer Sciences

The visual styles of iconic Detroit record label Motown held significance both during its prime in the 1960's and beyond. This research aims to evaluate two aspects of the costume history of Motown. Much of the design history is lost to the known record, and this project seeks to uncover the designers, labels, sourcing, and design development process as to how the performance clothing was selected, produced, and where it is archived. Through the examination of the garments and the development of the aesthetics, stories are revealed about the impact of Motown's dress choices on the wearer, the viewer, and in society in general regarding authenticity and identity. The label's aesthetic had relationships to the Vietnam War, the Civil Rights movement, and the overall culture of that era. This study conducts primary research by examining historic collections and exhibitions of the Motown museum, the Grammy Museum, and the National Museum of African American History and Culture, and speaking with historians, Motown artists, and their associates. Literature pertaining to the history of Motown also reveals information about the dress history embedded within greater narratives. This research deciphers interconnections and disconnections between the Motown artists' image, including on- and off-camera fashions, and the era of their greatest success.

The Effect of Sericea Lespedeza on Strongyle Fecal Egg Counts in Mature Horses

Marrissa Jean Blackwell
Dr. Kylee Duberstein, Animal and Dairy Science, College of Agricultural and Environmental Sciences

Equine parasite control is primarily accomplished through deworming programs that utilize anthelmintics to target small strongyles, and due to their widespread use, resistance is now a major issue. Studies in small ruminants have shown that condensed tannins found in sericea lespedeza (SL) play a role in reducing parasite load. The objective of this study was to analyze the effects of sericea lespedeza hay as compared to Russell bermudagrass (RB) on parasite load in horses.

Sixteen horses were divided into two treatment groups, each receiving 1.5% of body weight daily over four weeks. Fecal egg counts (FEC) were conducted at days 0, 14, 28, and 42 (two weeks after removing from treatments). Horses were randomly divided and housed in two adjacent pastures, and were brought into stalls for 6 hours/day to consume treatment diets. Average initial (day 0) FEC for horses on both treatment groups was high and not statistically different (SL=447, RB=451, P=0.98). All horses showed significant increases in FEC by day 42 ($P<0.001$). At day 28 and day 42, there were numerical differences between treatment groups with SL having lower FEC compared to RB (SL=317, RB=505; SL=1008, RB=1220 at day 28 and day 42 respectively), but high individual variation rendered this data not statistically significant (P=0.24, P=0.18 at day 28 and day 42 respectively). It was noted that in horses with FEC<50 epg (N=5), there was a statistical difference (P=0.0082) in FEC response between treatment groups, with SL horses showing no FEC increase, while RB horses showed an increase of approximately 100 epg by day 42.

MRI Compatible Response Keypad for Communication with Nonverbal Subjects

Brian Lawrence Boland, CURO Research Assistant
Dr. Zion Tse, Electrical and Computer Engineering, College of Engineering

The study aims to evaluate a new MRI compatible human response keypad designed for nonverbal subjects which is inexpensive and easily manufactured. The device is 3D printed in PLA plastic. Once assembled, the system alerts the operator when it senses interruption to the path of light across fiber optic cables caused by button presses. A combination of nonverbal and verbal subjects is split randomly into two groups. Group 1 subjects spend 15 minutes without the device in an MRI simulator. Subjects rate their mood on a predetermined numerical scale. Group 2 uses the device for the 15 minute period, and they also rate their mood. Subsequently, all subjects will use the device to perform several set tasks so that the ease of use and reliability of the device may be evaluated. It is anticipated that using the device will help alleviate feelings of anxiety to some degree. We expect that nonverbal subjects will feel less isolated when able to communicate. Reducing stress inside the MRI can help prevent panic, especially for people with communication disorders, by providing a simple option for an otherwise isolated person to connect with another human being. Tools like this have the potential to make MRI procedures more agreeable to a community of people with similar disabilities. Having increased communication could easily reduce the occurrence of image-blurring disturbances and the need for repeating scans. These benefits are shared by everyone involved in the form of saved time and money.

A Comparison of Functional and Fitness Traits of *Alliaria petiolata* along a Forest Gradient

Sydney-Alyce Bourget, CURO Honors Scholar, CURO Research Assistant
Dr. James E Byers, Ecology, Odum School of Ecology

Alliaria petiolata, commonly known as garlic mustard, is an invasive herb that has been spreading throughout the United States for over 150 years. In recent decades, garlic mustard has begun to invade the intact forest understory communities of eastern North America. The expansion of garlic mustard's invasive range into these habitats is a great concern, as garlic mustard exudes a chemical compound that inhibits the growth of essential soil fungi. The objective of this study was to determine whether garlic mustard populations located along a forest gradient exhibited different functional and fitness traits. We also sought to determine average height and fruit body yield between these populations over time. To conduct this study, an observational field experiment was set up in which the traits of garlic mustard populations located within the edge of a forest, intermediate forest, and forest understory were measured. These traits include height, number of leaf nodes, and reproductive siliques. Based upon data analyses, garlic mustard populations found within the edge habitats exhibited, on average, greater heights, leaf nodes, and reproductive siliques than any of the other microhabitats observed. Garlic mustard populations in intermediate sites exhibited the next greatest heights, leaf nodes, and reproductive siliques, while the forest population produced the shortest plants with the fewest siliques on average.

This data, along with previous data collected, would suggest that a source-sink dynamic is occurring in which edge populations are sourcing propagules into the forest understory.

The Role of Technology and Statements in the July 2016 Turkish Coup Attempt

Tucker Boyce
Dr. Benjamin Ehlers, History, Franklin College of Arts and Sciences

The events that occurred the night and early morning of July 15th and 16th, 2016, shocked citizens of Turkey and the world. The attempt produced scenes of protest and violence in major urban centers and destabilized an already-precarious Turkish political environment. Unlike previous coups in Turkey and elsewhere, this short-lived attempt was broadcast live on social media around the world. What was the role of technology and government rhetoric in the Turkey's July 2016 coup attempt, and how does this attempt compare to previous coups in Turkey? This research analyzes and synthesizes a more accurate timeline of the attempt using numerous Turkish and English journalism reports, social media from that night, and an academic background on the role of coups and the military in Turkey. The timeline of events is used as a foundation for further analysis of key statements from government officials and pro-coup forces. The synthesis of these statements provides a more complete and nuanced picture of the role of rhetoric and technology during the coup. The attempt's ultimate failure was due to a variety of reasons, but pro-government mobilization via social media and government statements were particularly key in stopping a military takeover of the government. In addition, a historical overview of previous successful and unsuccessful coup attempts provides points of contrast to the July 2016 attempt.

Exploring the Role of DNA Double-Strand Break Repair Proteins in CRISPR Adaptation

Sonam Alka Brahmbhatt, CURO Research Assistant
Dr. Michael Terns, Biochemistry and Molecular Biology, Franklin College of Arts and Sciences

In many prokaryotic organisms, Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR) and CRISPR-associated (Cas) proteins form a system (CRISPR-Cas) that provides adaptive immunity against foreign invaders such as viruses. The CRISPR-Cas system has three general stages: adaptation, crRNA biogenesis, and interference. While the mechanisms of the latter stages of the CRISPR-Cas system are well studied, many details concerning adaptation –the integration of foreign DNA into the CRISPR locus - remain obscure. Studies suggest that DNA double stranded break repair proteins, such as RecBCD in *E. coli*, may play a role in adaptation. The overall goal is to investigate the role of *S. thermophilus* DNA double-strand break repair proteins, RexA and RexB during the adaptation stage of the CRISPR process. RexA and RexB form a helicase–exonuclease complex and we hypothesize that the complex is important in generating short viral DNA fragments that are used by Cas proteins for integration into host cell CRISPR genomic locus. My project focuses on the expression and purification of these proteins for experiments to study and characterize their activity in an in vitro setting, with the expectation that the complex will generate short DNA fragments with properties similar to those observed to be integrated in CRISPR loci in vivo. This study is important to better understand the adaptation stage of CRISPR immunity. Developments in this field will reveal the exact mechanism of how foreign DNA is processed and incorporated into CRISPR loci.

Analysis of Genetic Diversity in *Asimina triloba* to Infer Historical Processes Responsible for Range Expansion

Jessica Mei Brown, CURO Research Assistant
Dr. Dorset Trapnell, Plant Biology, Franklin College of Arts and Sciences

The importance of natural versus pre-Colombian anthropogenic dispersal in post-glacial range expansion of the North American tree species *Asimina triloba* is being investigated. The large sweet fruit were highly prized by indigenous peoples and we hypothesize that humans were responsible for the dispersal of this species to the Northern US and parts of lower Canada, explaining 'Reid's Paradox' whereby plant species with limited dispersal ability migrated considerable

distances subsequent to glacial retreat. *Asimina triloba* samples collected throughout much of the species' range are being genotyped with nine nuclear microsatellite markers. Because neutral genetic diversity in contemporary populations contains the footprints of historical processes, we are able to discern natural versus anthropogenic origin of populations. Examination of four putative anthropogenic and four wild populations that are geographically paired revealed that wild populations had higher genetic diversity: a mean number of genotypes of 27.3 versus 1.3 per population, 89% versus 54% percent polymorphic loci, 4.5 versus 1.5 alleles per locus and expected heterozygosity of 0.562 versus 0.281. Ultimately, through the application of network analysis we will examine nodes of connectivity and infer patterns of movement and dispersal. This information can inform inference of the relative importance of natural versus anthropogenic dispersal, and provide a more complete understanding of how this species dispersed, colonized new habitats, and expanded its geographic range subsequent to glacial retreat.

Biochemical and Structural Characterization of vOTUs from Ganjam and Hazara Nairoviruses

Sarah Elizabeth Brown, CURO Research Assistant
Dr. Scott Pegan, Pharmaceutical and Biomedical Sciences, College of Pharmacy

Crimean-Congo hemorrhagic fever (CCHF), Ganjam, and Hazara are closely related nairoviruses. *Nairovirus* is a genus of RNA viruses including CCHFV. CCHF virus produces fever, prostration, and severe hemorrhages in humans. CCHF often has fatal effects in humans, while Ganjam and Hazara have only mild effects. However, Ganjam is often fatal in sheep. Hazara can be used as a model system for nairovirus infections. Within CCHFV is a viral homologue of the ovarian tumor protease (vOTU). Due to the close relationship between Hazara and CCHF, we can explore the differences between how the CCHF and Hazara vOTUs bind ubiquitin. Because Hazara is not our health concern, we can create and study structures of ubiquitin with Hazara and CCHF and ISG15 with Ganjam. As we study vOTUs, we can gauge between different viral proteases and their potential role in disrupting signaling pathways of the host cells that are dependent on ubiquitin or ISG15, such as the interferon type I response(IFN-I). These protein complexes must be purified and crystallized to create these structures which we will study. We anticipate creating Hazara with ubiquitin and Ganjam with sheep ISG15 structures to compare with existing structures of CCHF. Thus far we have preliminary data with some protein crystals that have some x-ray diffraction. These structures allow for a greater understanding of vOTUs as a class of proteases, so that we can address CCHFV in humans. By studying Hazara, we can create a model like CCHF to be able to discuss treatment and future therapeutic solutions.

Using Chlamydomonas as a Model for Oral-Facial-Digital Syndrome

Gehrig Broxton, CURO Research Assistant
Dr. Karl F Lechtreck, Cellular Biology, Franklin College of Arts and Sciences

Mutations in the *OFD1* gene are the cause of oral-facial-digital syndrome, a disease that results in severe malformations of the mouth, face, hands, and skeletal system. However, the cellular basis of this disease is not fully understood. The *OFD1* gene encodes for a protein localized to the base of the primary cilia, thin cell extensions with sensory and signaling functions also referred to as flagella. Here, we describe an *ofd1* mutant in *Chlamydomonas reinhardtii,* a widely used unicellular model for ciliary disease. Using polymerase chain reaction and gel electrophoresis, we confirmed an insertion of the paromomycin resistance cassette into the *OFD1* gene; we refer to this mutant strain as *ofd1-1*. The mutant strain was backcrossed to a wild-type strain to outcross potential second site mutations. We are now analyzing the phenotype of *ofd1-1*. Mutant cells possess flagella and are motile indicating that *OFD1* is not essential for the assembly of cilia in *Chlamydomonas*. I will now determine whether *ofd1-1* has a subtler phenotype such as changes in flagellar length or swimming behavior. *Chlamydomonas* facilitates the isolation of flagella allowing for a comparison of the biochemical composition of wild-type and *ofd1-1* flagella. Based on the severe phenotype of *Ofd1* mutations in mammals, we hypothesize that the mutation will have a noticeable effect on flagellar composition and function. Once the phenotype is characterized, the mutant strains will be rescued

by insertion of the wild-type gene, which should restore wild-type *OFD1* function.

Georgia Monetary Sanctions

Madison Lorene Brumbaugh, CURO Research Assistant
Jacob Scott Kepes
Dr. Sarah Shannon, Sociology, Franklin College of Arts and Sciences

This research project analyzes the application of fines, fees, and probation for misdemeanor criminal offenses throughout the state of Georgia. We collected three types of data to explore these processes. First, we collected quantitative data regarding fines and fees levied by each county from the years 2005 - 2015, including the total amount of money collected by each county per year, as well as the total amount of money collected for specific funds, per county, per year. Second, we systematically observed ~30 hours of court sessions in a large municipal court order to assess the application of these misdemeanor sanctions in a real courtroom. Third, we reviewed local governments' use of private probation companies to supervise people for misdemeanor offenses. We will present the current status of our research project and our exploratory findings to-date. Our analysis thus far shows that counties and municipalities in Georgia are collecting significant amounts of money, often at the expense of their own citizens, who are unable to pay.

Assessing the Removal of Lead from Water Using Commercially Available Filters

Austin Thomas Bryan
Dr. Kat Loftis, Vice President for Research Services, Research Units

Water sanitation, especially contamination with heavy metals, has attracted greater attention in recent years. The neurotoxic effects of chronic low-level lead exposure make its removal a concern for home water treatment systems. Commercially available faucet-mounted water filters are officially tested under controlled conditions that may not reflect in-home operation. In this study, commercially available faucet-mounted water filters were evaluated to determine whether lead-removal performance would be impacted by abnormally high concentrations of lead or varying degrees of water hardness. The goal of this study was to evaluate how varying conditions affect lead adsorptivity onto filter cartridges and the ability to remove lead from water samples. Two variables, lead concentration and water hardness, were evaluated for their impact on filter performance. Inductively Coupled Plasma Mass Spectrometry (ICP-MS) was used to determine lead concentration in the filtered test samples and unfiltered control samples. Filters were tested with 150 ppb and 300 ppb lead solutions. Preliminary data suggests that filters are capable of removing lead at concentrations two-fold greater than certification testing.

Nuclear or Solar, Why Does It Have to Be a Choice?

Cole Burgess, CURO Research Assistant
Dr. David Gattie, Environmental, Civil, Agricultural, and Mechanical Engineering, College of Engineering

When it comes to carbon free energy, we have limited options for generation sources. In the US, nuclear, wind, and solar are the three predominant carbon-free energy generation sources. This research investigates the advantages of nuclear and solar energy in Georgia in an effort to recommend which if any energy source should be further developed to meet future demands. In Georgia, solar is an attractive source for energy generation because out of the fifty states, the state receives the 10th greatest concentration of incident solar energy. This concentration of energy combined with falling costs of solar panels has helped foster one of the top growing solar markets in the US. The growth of the solar industry is complimented with a growth in the nuclear energy sector of Georgia as well. Plant Vogtle is currently constructing the first new nuclear reactors in the US in over 30 years. This addition of 2,234 MW of electricity will help establish the base load power required to have a functioning electrical grid. Though both sources of energy are carbon-free, there are vast differences in their respective advantages and disadvantages. In an effort to transcend public perception for both energy sources, a comparative economic analysis referenced to identical generation (MWh) has been conducted for each. While both energy sources

have their limitations, Georgia should maintain its diverse energy portfolio and continue with future development of both carbon free energy resources.

Mechanical Ventilator Parameter Prediction

Nicolas Rousseau Burgess
Dr. Ramana Pidaparti, Environmental, Civil, Agricultural, and Mechanical Engineering, College of Engineering

Parameter estimations for mechanical ventilator settings are essential in giving optimal treatment for patients suffering from compromised lungs. Establishing a relationship between these parameters and the patient outcomes while using a decision-making model can support clinicians by improving accuracy and minimizing error during treatment. We developed an artificial neural network model in conjunction with inverse mapping for this parameter estimation. We applied a novel graded particle swarm optimization for inverse mapping, where the designed variant of particle swarm optimization involves gradation in the swarm and a hierarchical strategy. This model was tested on data collected from the ongoing study at the Small Animal Teaching Hospital (SATH) at the University of Georgia (UGA) for canines and felines and we were successful in achieving high percentages of accuracies in parameter prediction. Further, we plan to develop an application platform, allowing multiple users to connect to a server running this learning model. The final application aims to assist doctors in setting mechanical ventilator parameters; we will first deploy the application for the doctors at the SATH at UGA.

Effects of Tracking Scale on User Performance in Virtual Reality Games

Ben Burgh
Dr. Kyle Johnsen, Electrical and Computer Engineering, College of Engineering

We explore how scaling a user's tracking data may impact performance in an immersive virtual reality game, which may have implications for fairness and accessibility for many applications. In our study, which used an HTC Vive room-scale VR system, users play as a factory worker who must remove deformed bread from a production line. Users were scaled to a reference height, such that taller than average users were rendered shorter and had shorter reach and shorter than average users were rendered taller and had longer reach than normal. Users also performed with unscaled tracking data. Our analysis indicates that there was no systematic advantage of being taller or shorter than normal, and scaling users may have had a detrimental effect. Moreover, scale changes were noticed by many users who had conflicting preferences for various application-specific reasons, indicating that application strategy can be affected by scale. Results suggest that while virtual reality tracking data may be scaled to compensate for user differences in physical height or reach, care must be taken to ensure performance will benefit.

Characterizing the Role of Inhibitory Neurons in Regulating Seizure Activity in Embryonic Zebrafish

Branson Byers, CURO Research Assistant
Dr. James D Lauderdale, Cellular Biology, Franklin College of Arts and Sciences

More than 50 million people worldwide suffer from epilepsy. Unfortunately, cellular and network level mechanisms behind this condition remain poorly understood, and skull thickness and large brain size inhibit observing cellular and network activity simultaneously in mammals. As an adjunct model system for studying seizure generation and propagation, the small, transparent embryonic zebrafish allows for observation of entire neural networks with cellular resolution. Seizure-like activity can be induced in zebrafish through manipulating the signaling of the inhibitory neurotransmitter GABA. We have genetically engineered a line of zebrafish in which we can visualize both whole brain activity (GCaMP5G) and the location of GABAnergic, inhibitory neurons (gad1b:RFP). By using light sheet microscopy for high-resolution calcium imaging in vivo, we can image seizure activity in real time and eliminate noise from tissue in other planes of focus. Using RFP tagging of GABA expression, we compare the propagation of seizure activity to the location of inhibitory neurons. Reducing GABA levels in inhibitory neurons by inducing CRISPR-Cas9 mutations in gad1b, we can alter the efficacy of the subset of GABAnergic, gad1-

expressing neurons. By examining the effect of this mutation on the propagation of seizure activity, this study aims to characterize the role of inhibitory neurons in regulating seizure activity in the embryonic zebrafish.

The Relationship between Nutrition Status and IADLs in Community-Dwelling Older Adults

Sarah Caesar, CURO Research Assistant
Dr. Steve Miller, Psychology, Franklin College of Arts and Sciences

Dietary factors have been associated with neurocognitive health in late life, but the relation to functional independence remains largely unexplored. The present study sought to fill this gap in the literature. It was hypothesized that greater intake of fruits, vegetables, and fish would be positively associated with instrumental activities of daily living (IADLs) in a sample of older adults (N=134, 62% female, mean age = 74 years). IADLs were measured using the Direct Assessment of Functional Status-Revised (DAFS-R), a performance-based measure of cognitively-demanding tasks, such as handling finances and managing medications. MyPyramid guidelines were used to categorize participants into low versus high intake groups on each nutrition variable. Individual and combined effects of the nutrition variables on IADL scores were assessed. Education, gender, and age were considered as potential covariates. Results showed that older adults who consumed high amounts of fish were more functionally intact than their counterparts who consumed low amounts [$t(128) = 1.84$, p=.034, Cohen's $d = 0.359$]. However, this finding was reduced to non-significance when controlling for education ($p = .203$, $d = .237$). Fruit intake ($p = .757$, $d = -.238$), vegetable intake ($p = .910$, $d = -.124$), and overall nutrition status ($p = .382$, $d = -.155$) did not significantly relate to IADLs. These findings add to the limited literature evaluating the relation between nutrition status and functional ability in older adults. Results suggest fish intake may protect against age-related loss in functional independence, though education level attenuates this relationship.

The Affordable Care Act's Effect on Perceived Mental Health Outcomes and Substance Abuse Treatment

Trace Calloway, CURO Honors Scholar, CURO Research Assistant
Dr. R. Vincent Pohl, Economics, Terry College of Business

The Mental Health Parity and Addiction Equity Act of 2008 sought to improve insurance coverage for mental health issues and addiction treatment, two areas that many insurance plans did not adequately cover. The Affordable Care Act (ACA) continued down this path by altering the financing and delivery of mental health and addiction care even more profoundly in the attempt to cover more people and provide better care. Was it successful? Did the ACA improve substance abuse treatment in the United States through its mental health parity mandates? Improvement would be measured by an increase in patients receiving treatment, perceived mental health status, and reduced spending—both total and out-of-pocket. Using a difference in difference calculation on the mental health status and treatment use before and after the ACA rollout, I attempt to isolate and measure the effects of the ACA across state lines. My data concerns the perceived mental health status of surveyed individuals as recorded in the Behavioral Risk Factor Surveillance System and treatment data from the Substance Abuse and Mental Health Services Administration.

Women's Fate

Leighton Carlock
Dr. Joel Black, Comparative Literature, Franklin College of Arts and Sciences

Last year, I had the opportunity to study abroad in China, and through my studies, I came across a word I did not understand. Yes, this happened frequently, but this particular word had an odd translation. The word is shengnu, and the translation is "leftover woman." At first, I thought this was referring to an impoverished woman, but when I tried to use it in this context, people snickered. I had seen this word in the newspaper and in magazines, and when spoken I detected the odd reaction on my friend's faces. At last it was explained that a leftover woman is any woman over the age of twenty-six who is still single and has no prospects of marriage. My immediate reaction was confusion. Why are these women

leftover? Why are these women not allowed to be and do what they want to do? I knew there must be more to this, and I was right. Shengnu is a new term, originating in the last decade. However, my research project argues that the concept is influenced by Confucianism, the oldest reigning philosophy, ideology, and belief system in China. Confucian ideals are in many ways the underlying thread of many aspects of present-day Chinese culture: politics, art, literature, humor, and film. The rhetoric regarding leftover women structures a society that puts women at fault. Their happiness is put on the back burner in the name of ancient Confucian "harmony" and the "stability" of the People's Republic of China.

Role of Bacterial Polysaccharides in Bacteriophage Invasion

Alexandra Carlton, CURO Research Assistant
Dr. Maor Bar-Peled, Biochemistry and Molecular Biology, Franklin College of Arts and Sciences

Bacteriophages are viruses that specifically infect bacteria, relying on the host bacterial cell to reproduce and propagate. In order to use the replication mechanisms within the bacteria, the phage must first enter the cell by means of recognition factors. Glycans, sugars that can be linked to a variety of different molecules, play a significant role in cell-to-cell communication and recognition of outside material. The components of this specific phage-bacteria recognition remain unknown. The aim of this study is to identify the role of bacterial polysaccharides in phage invasion or avoidance. Multiple glycolytically-mutated strains of *Bacillus cereus* will be tested for susceptibility to bacteriophage infection in vitro in order to monitor differences in biofilm formation, flagella glycosylation, and other key processes. We expect to find that some mutants will alter successful bacteriophage invasion. Previous studies of glycoproteins have aided our understanding of the mechanism of infection by particular phage strains. We hope that by identifying the polysaccharides affected by the mutant strains, we will further our understanding of specific bacteriophage recognition.

Child Disability and Maltreatment: Caregiver Support as a Protective Factor

Savannah Carroll, CURO Research Assistant
Dr. Assaf Oshri, Child and Family Development, College of Family and Consumer Sciences

Studies show that children with disabilities are at greater risk for maltreatment by their caregivers compared to children without disabilities. Therefore, it is essential to uncover risk and protective factors for maltreatment among children with disabilities in at-risk families. Evidence indicates that the level of social support caregivers receive can buffer against risk for child maltreatment. Despite the importance of caregiver social support, no research has empirically examined it as a buffer between child disability and maltreatment, measured by Child Protective Services (CPS) reports. Presently, we hypothesize that disability will be a predictor of four types of maltreatment (physical abuse, sexual abuse, emotional abuse, and neglect) and that social support will serve as a protective factor. To examine this hypothesis, we will conduct a secondary data analysis using a longitudinal sample from the LONGSCAN dataset (N = 1,354). A multiple regression will be used to examine how disability at age 4 influences the number of CPS reports between ages 4 to 8. Perceived social support will be examined as a protective factor. Preliminary results demonstrate that when there is low social support, child disability predicts higher rates of physical abuse, sexual abuse, and neglect compared to children without disabilities. Thus, higher levels of social support were found to buffer the link between disability and maltreatment. This research will inform policymakers, the medical community, and educators on the increased risk of children with disabilities to be victims of maltreatment and the importance of identification and prevention of child abuse and neglect.

The Insect Version of Oxytocin Influences Female Tolerance of Males in a Subsocial Beetle

Annika Carter, CURO Research Assistant
Dr. Allen J Moore, Genetics, Franklin College of Arts and Sciences

The ability to express the correct behavior is essential for the survival of most organisms. One such important behavior is sociality — the motivation to be around or tolerance of conspecifics. The insect ortholog of mammalian

oxytocin/vasopressin, inotocin, is known to be present in the subsocial beetle *Nicrophorus vespilloides*. During mating, female *N. vespilloides* beetles may be more or less accepting towards a male's mating attempts. Given the association between oxytocin/vasopressin and changes in sociality during mating in mammals, we hypothesized that the *inotocin* (*it*) and *inotocin receptor* (*itr*) genes would be differentially expressed across the female beetle's mating cycle and would be differentially expressed between females that are highly accepting or rejecting of a male during mating trials. To test this in *N. vespilloides*, we compared relative gene expression across stages of a breeding cycle: virgin females, mated females, mated females preparing a resource required for reproduction, directly and indirectly caring females and post-caring females. We also compared relative gene expression from virgin females who readily accepted males in mating trials to females who rejected males in mating trials from two different groups — one collected immediately after mating and one collected following 24 hours in an enclosed container. Expression varied for both *it* and *itr* across the five breeding stages. The expression of *it* and *itr* was significantly lower in post caring females and the expression of *itr* was significantly lower in resource preparation females. Expression of *it* and *itr* varied between the accepting and rejecting females and between the immediate and 24 hour time period. Both *it* and *itr* expression was significantly higher in accepting females. *it* expression was significantly reduced at the 24 hour time period. *itr* expression was significantly greater at the 24 hour time period. We suggest that *it* and *itr* are associated with the changing general sociality of *N. vespilloides* that occurs during mating, but not necessarily with parental care specifically.

Motivations and Barriers of Volunteering among College Freshmen

Alexandra Case, CURO Research Assistant
Dr. Jessica Holt, Agricultural Leadership, Education, and Communication, College of Agricultural and Environmental Sciences

The purpose of this study was to understand motivations and barriers behind volunteering practices of college freshmen at the University of Georgia (UGA). The demographics of gender, race, religion, income, and political ideology were included in this study to determine if those were related to students' volunteering behaviors. This study is timely due to a recent rise in college student volunteering and the implementation of the new experiential learning requirement for all UGA students. UGA freshmen were surveyed using an online survey (n = 348) disseminated through email. The survey was divided into three parts: motivations, barriers, and demographics. Preliminary analysis of the results has revealed that the top motivators for all demographics were related to personal beliefs and extra time, while the top barriers for all demographics pertained to a lack of time and a need to focus on oneself. It was also discovered that beliefs about volunteering were significantly more positive across all respondents and those who choose to volunteer felt supported and fulfilled. This study will give the Center for Leadership and Service a more comprehensive understanding of why or why not freshmen choose to engage in volunteering behaviors, as well as provide recommendations to engage those students not currently engaging in volunteering behaviors.

Latino Resilience among Undocumented Families

Genesis Castro, CURO Research Assistant
Dr. J. Maria Bermudez, Child and Family Development, College of Family and Consumer Sciences

The aim of this study is to examine effects of detention and deportation practices on mixed-status Latino families in the South. There is an urgent need and a significant lack of empirical data to help scholars and practitioners better understand the extent to which children and families are affected by current immigration policies and practices. We use a culturally responsive, community-based, participatory action mixed-method design. We assert that the untold disruption and immigration trauma among these individuals, families, and communities will help us formulate a framework for understanding Latino family risk and resilience and inform current immigration policies. Our goal is to be able to share what factors contribute to positive youth development among undocumented or Deferred Action for Childhood Arrivals students with the public, with the hope that schools, families, and

community members apply our findings to their interactions with students.

"Immigrants, We Get the Job Done!": Depictions of the U.S. Immigrant Experience on Broadway

Izzy Ceron, CURO Honors Scholar, CURO Research Assistant, Foundation Fellow
Dr. Edward A Delgado-Romero, Counseling and Human Development Services, College of Education

A recent crop of Broadway musicals, plays, and revivals delve heavily into the nuances of the immigrant experience in the United States. Given the current anti-immigrant and xenophobic political climate, what do popular Broadway productions tell us about the current perception of what it means to be an American? Broadway has played a crucial role in the American psyche since its inception, both reflecting and shaping perceptions of important social issues. From the revival of *West Side Story* to the runaway success of *Hamilton: An American Musical*, the immigrant experience has been at the forefront of theatrical content in the last decade. This study examines eight popular theatrical works performed on Broadway throughout the past decade and analyzes the depictions of various immigrant communities and experiences in the US. This study is still in the formative stage and summarizes preliminary conclusions from an extensive literature review. The study will be a qualitative analysis of each work's script, focusing on themes of immigration and the US immigrant experience. Ultimately, this study aims to gain insight about the broader implications of prototypes and stereotypes depicted on stage and the way these depictions may both reflect and shape public perception of immigrants in the US.

The Role of Non-Cas Proteins in the Adaptation Stage of CRISPR-Cas in *Pyrococcus furiosus*

Chip Chambers, CURO Honors Scholar, CURO Research Assistant, Foundation Fellow
Dr. Michael Terns, Biochemistry and Molecular Biology, Franklin College of Arts and Sciences

CRISPR is a powerful biological tool that has taken the scientific community by storm due to its powerful genetic engineering capabilities. Many of its basic biochemical mechanisms, however, have yet to be uncovered. CRISPR contains three stages: the adaptation stage, in which a prokaryote acquires DNA from an invader and integrates it into a CRISPR locus, the expression stage, where the CRISPR array is transcribed and processed to form crRNAs, and the interference stage, during which an effector complex uses the crRNA guides to target and silence invaders. My work investigates the potential roles of non CRISPR-associated (Cas) proteins in the initial adaptation stage of the CRISPR-Cas system. These include Argonaute (a DNA-guided nuclease), HerA (a helicase of Archaea), NurA (a nuclease of Archaea), and Hef (which repairs stalled replication forks). We are interested in the Argonaute protein because it serves as an innate defense system and plays a role in RNA/DNA-silencing. HerA, NurA, and Hef on the other hand, are all involved in DNA repair, but might also play a role in adaptation. We are specifically looking at the roles of these proteins in vivo within the host organism *Pyrococcus furiosus*, a hyperthermophilic archaeon used in various industrial processes. Utilizing knockout strains and polyhistidine tagged proteins, we performed assays to determine whether these proteins influence the frequency of adaptation and/or introduce a bias for the location or size of spacers. Ultimately, these findings may contribute to the body of general knowledge of this revolutionary technology.

Transcriptomic Investigation of Disease Tolerance in the Ochre Sea Star *Pisaster ochraceus*

Katelyn Chandler
Dr. John Wares, Genetics, Franklin College of Arts and Sciences

Sea Star Wasting Disease (SSWD) causes the tissues of echinoderms to decay rapidly and is responsible for a current mass mortality event among *Pisaster ochraceus*. Sick *P. ochraceus* were found to be approximately 20% less likely to be heterozygous for an insertion mutation at the elongation factor 1-alpha (EF1a) locus. This insertion at EF1a is known to be lethal when two copies are present; it appears to be maintained by heterozygote advantage in fitness. A statistically significant difference in gene expression between

the *P. ochraceus* genotypes might explain the possible advantage of heterozygotes in relation to SSWD. RNA was isolated from tissue samples collected from *P. ochraceus* individuals found in Friday Harbor, Washington. RNA-seq was then used to measure the differentiation in gene expression between individuals found to be the homozygous wild-type and heterozygous for the insertion at EF1a. Observations of differentiation in gene expression between the two genotypes found to be statistically significant were studied to interpret possible biological significance. Of particular interest were observations with high fold differences, expression present in one genotype but not the other, and doubled expression in the homozygotes versus the heterozygotes. The difference in propensity to be affected by SSWD based on genotype suggests that somewhere among these observations of interest a phenotypic difference is caused between the two genotypes, rendering SSWD inefficient or ineffective at infecting heterozygotes compared to homozygotes at EF1a. The mechanism of this phenotypic difference could be invaluable in understanding how SSWD works.

Compiling Studies on Pedagogical Content Knowledge within Topics of Evolution

Raheela Charania
Dr. Tessa Andrews, Genetics, Franklin College of Arts and Sciences

Understanding a topic in class is critical to learning the topic. The learning opportunities provided by the instructor are strongly associated with whether students learn (Smith et al. 2016). Pedagogical content knowledge (PCK) is one type of knowledge that helps instructors teach to facilitate student learning. PCK includes knowledge of misconceptions commonly held by students and addresses the misconceptions that can be critical to promote learning. In this project, we are identifying PCK currently available in the literature within the topic of evolution. To find relevant abstracts, we use a combination of search terms that allow us to locate articles that describe evolution PCK in various education levels and topic areas. This research will allow us to identify trends in the field of evolution education research and determine what has and has not been investigated previously. This will allow us to make recommendations for the progression of the field based on where there is a surplus and where there is a need. We will also be able to summarize PCK in evolution education for practical use in an undergraduate classroom.

The Personal Touch of Discovering Money Solutions

Marcus Chatman, CURO Research Assistant
Dr. Matt J Goren, Housing and Consumer Economics, College of Family and Consumer Sciences

The financial education curriculum, presented as PowerPoint presentations and hands on activities, of the Discovery Money Solution program is part of the Healthy Marriages and Relationship Education Program, and is purposed to aid families in bettering their economic stability. The 6-hour curriculum, which is separated into three 2-hour classes, is facilitated by two coaches. It addresses attitudes toward money and presents specific tools and solutions for participants. By collecting feedback from participants after each class, researchers will have a greater understanding of the subjective benefit of the various aspects of the class and curriculum. The assumption may be that the well-developed presentation and handout materials will be the most valuable aspect of the class for participants. Though the content will evolve based upon feedback over time, the presence of professionals may be of greater significance. If the interaction of coaches and participants supplies great value to the learning experience, as teachers do with students, then the opportunity to consult and collaborate with financial professionals creates the greatest impact upon the learning experience. The curriculum will always be predominantly consistent, but the presence of interactions between coaches and participants unique to each class will significantly influence the participant satisfaction with the overall course and resulting impact upon financial well-being. As displayed by the publicized dissatisfaction of automated customer service in telecommunications and web services, human interaction in cognitive learning and problem solving is critical.

Effect of Ground Granulated Blast-Furnace Slag (GGBFS) on Heat of Hydration Concrete

Jonathan Chelena, CURO Research Assistant
Dr. Mi Chorzepa, Environmental, Civil, Agricultural, and Mechanical Engineering, College of Engineering

Cement hydration produces a rise in internal temperature, and the outer concrete surface cools faster than the core of the section. By thermal expansion/contraction, the temperature differential induces thermal stresses at the surface. Once the maximum temperature in the interior exceeded the accepted threshold value, DEF (delayed ettringite formation) can occur in mass concrete elements. Therefore, DEF can be prevented by limiting the internal concrete temperature during its very early life. The maximum temperature suggested by prior research efforts to prevent DEF in concrete elements is 160°F. This reduced temperature can be achieved by direct specification of temperature allowable, by limiting the cement content, or by specifying the use of low heat supplementary cement materials. This study includes the design, batching, and testing of concrete mixtures with cement replacements of slag while keeping the total amount of cementitious material constant. Mechanical properties and heat of hydration are being measured for each mix design. An isothermal calorimeter is being used to measure the heat generated from the early hydration of cementitious materials. It is concluded that relatively low heat of hydration is observed in the slag mixture compared with the fly ash mixture.

Autonomy and Health Literacy Relationships as a Link to Patient and Provider Satisfaction

Eli Chlan, CURO Research Assistant
Dr. Lisa Renzi Hammond, Psychology, Franklin College of Arts and Sciences

Health literacy in the United States varies widely by gender, age, ethnicity, income level, and education status. It has been speculated that health literacy, in turn, limits patient autonomy. Despite this fact, patient autonomy has not been characterized in the majority of populations that frequently consume healthcare. The purpose of this proposal is to characterize autonomy, health literacy, and their relationship within two different populations. For the first part of this study, UGA undergraduates will be recruited to complete a survey assessing feelings of autonomy in recent health care visits. It is hypothesized that young, high literacy patients are also likely to be high in perceived autonomy. The second part of the study will involve undergraduates coming to the UGA Health Center (UHC) for medical visits and being randomly asked to fill out either a pre-visit survey on health literacy, or a pre-visit survey on autonomy. Following their visit, all participants will receive a follow up survey, and HCPs at the UHC will also receive a survey about their patient encounter but are masked to the intervention. It is hypothesized that patients primed with the autonomy survey will ask more questions about their diagnosis, will expect their HCP to be a partner in the decision making process, and will have higher adherence to prescribed treatments. The third part of the study will replicate this test scenario in a local free clinic that serves a largely impoverished population with low health literacy and low health access.

Development of Cellulose NanoFibrils (CNFs) Composites for Packaging Applications

Crystal Chu, CURO Research Assistant
Dr. Sudhagar Mani, Chemical, Materials, and Biomedical Engineering, College of Engineering

As consumers become increasingly eco-conscious, research into biomass derived polymers from replacing traditional petroleum plastics rises in importance and attention. These studies were conducted to determine water and chemical resistance of nanocellulose and alginate composite films for potential use in packaging. Five different film compositions were created with glycerol as the plasticizer for this research: a control of alginate, a control of nanocellulose, and three different ratios of alginate to nanocellulose composites. Three replicates per composition were used to support the accuracy of our results through a study of the standard deviations calculated. Water uptake testing was conducted by laying known weights of dried film samples in a desiccator with deionized water and measuring the water mass gained by the films over time. Water and chemical resistance studies were conducted by submerging known weights of dry film samples in either deionized water or a known solution, measuring the change in sample mass over time.

The percentage of water uptake by the films indicate that the nanocellulose control is highly hydrophilic while the composite films are more resistant to water penetration, both while submerged in water and while exposed to 100% humidity. Similar results as above, from water uptake and water resistance testing, are expected from the chemical resistance studies. The mechanical strength and biodegradability of developed films were also measured and compared to standards of current packaging products available as a benchmark for our development of cellulose nanofibrils composite films.

Examination of *Mycobacterium tuberculosis* Protein Expression in Infected Lung Tissue

Nicholas Ciappa, CURO Research Assistant
Dr. Russell Karls, Infectious Diseases, College of Veterinary Medicine

Tuberculosis (TB), caused by *Mycobacterium tuberculosis* (*Mtb*) is the leading cause of death by a single infectious agent in humans. In host tissues, *Mtb* can be identified through immunohistochemistry (IHC), a method that utilizes antibodies to detect specific proteins or other biomolecules. The focus of the current project is to determine where *Mtb* bacteria are located within the lungs of infected guinea pigs, a model system for human disease, and which *Mtb* proteins are expressed in this environment. Immunohistochemistry staining revealed Rv0097c-specific staining in the periphery of lung granulomas, but not within the necrotic granuloma centers. A granuloma consists of immune cells that surround an infectious center to contain the infection. The presence of Rv0097c in granulomas suggests that this protein is important for *Mtb* survival in this hostile environment. We are in the process of examining whether Rv0097c-specific staining is similar to immunohistochemical staining of *Mtb* secreted or bacterial surface-localized proteins. Such studies will aid in evaluating whether these proteins have potential as vaccine targets.

CdaI-1 Kinase of the Hippo Pathway in *Tetrahymena thermophila*

Diamond Clarke, CURO Research Assistant
Dr. Jacek Gaertig, Cellular Biology, Franklin College of Arts and Sciences

The ciliate, *Tetrahymena thermophila*, is a eukaryote that has a complex cortical pattern. These ciliates contain organelles such as an oral apparatus, contractile vacuole pores, and ciliary rows that are present at predictable positions on the surface of the cell. *Tetrahymena thermophila* undergoes equatorial cell division. CdaI is a Hippo/Mst kinase of the conserved Hippo pathway. In animals, this pathway controls organ size by regulating cell divisions and polarity. In the temperature-sensitive *cdaI-1* mutant of *Tetrahymena*, there is an improper anterior shift of the division plane that results in unequal cell division. This research focuses on the exact molecular role of CdaI in the equatorial cell division. A GFP-encoding sequence was added to the 3' end of the *CDAI* gene. We used immunofluorescence with anti-GFP antibodies to view the localization of CdaI. CdaI was not detected in interphase cells. Initially, CdaI-GFP localized to the anterior half of the dividing cell and later marked the newly-forming posterior end of the anterior daughter subcell. After analyzing the *cdaI-1* mutants, we also found that CdaI is not required for the formation of the new cortical organelles at the posterior end. CdaI's sole function appears to be the maintenance of the equatorial division plane. The Hippo pathway is highly conserved and present in all eukaryotic cells including mammals. Findings from this research could be applied to understanding of how other eukaryotic cells control their division plane.

Effect of Prescribed Burning of Riparian Zones on Stream Hyphomycete Fungi Productivity

Sarah E Clement, CURO Summer Fellow
Dr. Catherine Pringle, Ecology, Odum School of Ecology

Fires are an important structuring element of forest ecosystems – those naturally occurring and those used for forest management, and can vary in their severity and impact. Nutrient release in the form of nitrogen is one of the known short-term effects of forest fires in aquatic ecosystems, and this can potentially affect stream fungi. While nutrient enrichment has been shown to increase

aquatic fungal abundance, species richness and reproductive output (in the form of conidia production), there are very few studies on the effects of fire on stream fungi. This study aims to test if nutrient release from fires causes a similar effect on stream fungi as artificial nutrient enrichment using two different leaf types: one recalcitrant (Rhododendron) and one highly labile (Red Mable). This study is part of a USDA Forest Service Project that involved prescribed burning of Rhododendron-dominated riparian vegetation along a 300m stream reach in the Nantahala National Forest, North Carolina. To examine fungal response to the burn, leaves were incubated in the stream reach both pre- and post- burn. Fungal biomass was analyzed over time both pre- and post-burn by extracting ergosterol from incubated leaves. We predict that: increased nutrients post-burn will cause an increase in fungal biomass on both leaf types; leaf decomposition rates will increase as fungal biomass increases; and increases in fungal biomass will be greater for Red Maple than for Rhododendron.

Predicting Oyster Larval Recruitment and Growth Using Cheaply Obtained, Remotely Sensed Data

John Coffin, CURO Summer Fellow
Dr. James E Byers, Ecology, Odum School of Ecology

The Eastern Oyster, *Crassostrea virginica*, is an important ecosystem engineer in estuarine systems that physically alters and provides habitat for other species and stabilizes banks. 88% of reefs worldwide have been reduced by overharvesting and habitat degradation. Resource managers need better data to improve management practices. Larval recruitment and growth are key parameters governing the population dynamics of oysters, and are thought to be influenced by current velocity and wave energy. This study consisted of 60 sites surrounding St. Catherines Island, Georgia. Oyster reef sites were divided into three habitats—creeks, rivers, and sounds—based on different current and wave regimes, and sites were randomly selected from each habitat. Non-reef sites were also selected, as a control. Recruitment was estimated monthly by counting settled larvae on collection sticks, and average biomass and shell length over the four month study period provided growth information. Analysis by habitat revealed biomass did not vary between habitats, though average shell diameter was higher in sites containing a pre-existing reef than in bare sites, perhaps due to size-related selective pressures. Over the entire study, recruitment was lower in creeks than in rivers and sounds, suggesting water body width may impact recruitment, as larvae must travel greater distances to reach creeks, diminishing larval supply. Future work will utilize remote sensing to analyze how current velocity and wave energy drive larval recruitment and subsequent growth. A positive relationship is expected between current velocity and recruitment, while a negative relationship is expected between wave energy and growth.

Risk Factors for Social Isolation in Elder Care Recipients

Haley Cohen, CURO Research Assistant
Dr. Steve Miller, Psychology, Franklin College of Arts and Sciences

Physical and mental health and cognition are important variables for predicting older adults' social isolation. However, these relationships have not been addressed within the context of caregiver and care-recipient relationships. As relationships with caregivers may be important for older adults' well-being, this study examined how caregiver variables of physical health, mental health, and cognition relate to care-recipient social isolation in a sample of 450 caregiver/care-recipient dyads. We also examined the relation of care-recipient physical health, cognition, and functional independence (FI) to care-recipient social isolation. All care-recipients were cognitively or physically impaired older adults aged 60+ years. Physical health, mental health, and FI were assessed via scales adapted from Schultz et al., 1997, Katz et al., 1996, and Katz et al., 1963 and Lawton & Brody, 1969, respectively. Cognition was measured using the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS). Hierarchical regression models were used to assess the unique variance contributed by each caregiver and care-recipient variable-of-interest on care-recipient social isolation, controlling for care-recipient dementia diagnosis and all other variables-of-interest. Contrary to expectations, none of the caregiver variables-of-interest significantly predicted social isolation above and beyond controlled variables. However,

as expected, care-recipient physical health (ΔR2 =.022, p=.033), FI (ΔR2 =.038, p=.001, and RBANS score (ΔR2 =.013, p=.045) each uniquely and significantly predicted social isolation, with declines in FI being the strongest predictor. Our findings have implications for patient care and highlight the importance of social interactions for elderly care-recipients, even in the context of declining physical and cognitive health.

Determining Water Usage of Lettuce under a Sodium Light Source for Indoor Agriculture

Rachel Collier, CURO Research Assistant
Dr. Bill Tollner, Environmental, Civil, Agricultural, and Mechanical Engineering, College of Engineering

How can we make agriculture more sustainable? Water is a needed natural resource in agriculture and light is a needed input. Water is applied to crops using water use curves which have been developed based on the uptake rates and evapotranspiration rates of crops. The curves were developed for crops different than the current varieties grown today. Additionally, indoor agriculture is increasing as a way to grow crops while being sustainable and providing food in locations where there are food deserts. Therefore, this research investigates the growth of lettuce grown under sodium lights and two different water levels. The lighting used for this project was a 1000 watt high pressure sodium light. Lettuce was planted in 16 inch pots with Tifton Loamy Sand. The plants were watered at two different treatments. The treatments followed the application rate of water according to the current water use curve and let the soil get depleted by 20% and 50%. Water was measured and applied by hand in volumes equal to the required volume calculated from the evapotranspiration equations. Lettuce plants were measured for height to determine growth rate and will be harvested and weighted to determine yield per volume. This project will provide information on the water use rates of lettuce grown indoors under high sodium lights. The information gained from this project should provide information on the water use rate and evapotranspiration rates of crops grown indoors under artificial lights to determine if this is a sustainable method of growing crops.

Resiliency and Sustainable Organizations: Leveraging Weather Management Systems

Zac Commanday
Brian Northern
Dr. Richard Thomas Watson, Management Information Systems, Terry College of Business

In the face of the far-reaching and urgent consequences of climate change, organizations and governments around the world are seeking to mitigate their exposure to environmental risks within the broader context of a deteriorating planetary ecosystem. Fortunately, there are tools and technologies being developed to deal with the effects of climate change. This wave of emerging technology is helping guide a new frontier for information systems. Leading organizations and government are now leveraging these Information systems, such as Weather Resiliency Management Systems (WRMS), to mitigate their exposure to environmental risk. Specifically, we ask how climate change influences the creation, adoption, and use of WRMS. To help explain this phenomenon, we examine several cases where WRMS are likely candidates to inform resiliency-related decision making. Because cities have been at the forefront of resiliency (a stream of research referred to as "urban resiliency"), we selected this context for our inquiry. Our starting point is the list of "100 Resilient Cities," which was pioneered by the Rockefeller Foundation to help cities around the world become more resilient to physical, social and economic challenges. As part of our research, we will conduct interviews of Chief Resilience Officers (CRO) and other key stakeholders for the cities identified by the 100 Resilient Cities initiative. These interviews will provide information on plans for current or future implementations of WRMS and on system constraints and challenges associated with implementation in terms of both technical and organizational feasibility.

The First Amendment Protections Afforded to Student Newspapers at Public Universities

Aaron Conley, CURO Honors Scholar, CURO Research Assistant, CURO Summer Fellow
Dr. Barry Hollander, Journalism, Grady College of Journalism and Mass Communication

One of the most foundational ideas in the legal code of America comes in the form of the First Amendment of the United States Constitution. This amendment has served as the basis for many judicial decisions that have shaped the legal development of the US. In terms of the media, one of the most significant of those developments is the establishment of shield laws, which protect reporters from being forced to reveal the identity of confidential sources of information. Shield laws exist only at the level of state statutes, however, so a high degree of variance exists in how these protections are afforded to journalists. One area where this variance can be seen most plainly is in the protection that is afforded to those seen as professionals as opposed to amateurs. This is especially troubling for journalists at the collegiate level. This research examines this question surrounding this extension of protection, or lack thereof, by analyzing the variations in state shield statutes. This research also analyzes the recent events at the University of Kentucky, where the university has sued its own student newspaper in an attempt to force the paper to release documents that contain information that reporters are endeavoring to keep confidential.

Mushroom Biochar: The Properties and Potential Applications of Novel Biochars Derived from Mushroom Fruiting Bodies

Jared Conner, CURO Research Assistant
Dr. Valentine A Nzengung, Geology, Franklin College of Arts and Sciences

This research investigates the properties and applications of biochars derived from mushroom fruiting body feedstocks. We observed the unique hyphal structure of mushrooms, and hypothesized that these would produce a biochar with a unique structure that significantly enhances biochar applications that depend on surface area and morphology. The four species of mushrooms examined in this research were pyrolyzed at two temperatures. The biochar physical and chemical properties were analyzed, and then the biochar was evaluated for application potential in removal of multiple contaminants from agricultural and industrial wastewaters. This involved physical and chemical testing, as well as SEM imaging. Here, preliminary results are presented, along with pyrolysis data, pH data, and sorption test results for these biochars. Ongoing efforts to enhance the remediation capabilities of these biochars via iron impregnation are discussed. Sorption experiments for remediation of wastewaters showed that mushroom biochars can remove contaminants that conventional biochars cannot, and can remove ammonia more effectively than other biochars. pH testing showed that the three fast-growing, soft-tissue mushroom species had biochars with a high pH, while the slow growing, woody bracket species had a biochar with a lower pH. The results of this research indicate that mushroom biochars could be used as effective remediators of wastewaters, and therefore could decrease the impact of agricultural and industrial wastewaters on soil and water quality. SEM images revealed an open-celled morphology, which could indicate that these biochars have applications in industry that other biochars are ineffective at due to their porous, closed structures.

Effect of Mythic Primers on Psychological Well-Being

James Conners
Dr. Leonard L Martin, Psychology, Franklin College of Arts and Sciences

According to scholar Joseph Campbell, mythologies can provide for the "rapture of being alive," among other benefits (*The Hero with a Thousand Faces*, 1949). The present study examines whether certain mythic elements can serve to improve psychological well-being. We exposed n participants to "hero's journey" motifs found in popular films; specifically, in *Star Wars: A New Hope* (1977) and *Finding Nemo* (2003). A control group of n participants was exposed to an assortment of comparatively neutral tropes. For one week, both groups were instructed to observe their lives for occurrences of these respective motifs, and received daily reminders in the form of a mobile questionnaire (P.I.E.L. survey app, IOS) requesting that participants denote occurrences as they arose. At the end of the trial period, participants were self-assessed in regard to their perceived meaning in life, gratitude, awe, and capability for entering the state known as "flow" (Csikszentmihalyi 2008). We predict that exposure to "hero's journey" motifs will be associated with an increase in awe, gratitude, and flow.

Exposure to Synthetic Estrogens Disrupts Meiotic Division in Germ Cells

Madison Cook, CURO Research Assistant
Dr. Maria M Viveiros, Physiology and Pharmacology, College of Veterinary Medicine

Synthetic estrogens, such as Bisphenol-A (BPA) that are prevalent in plastics are recognized as endocrine disruptors that can adversely affect reproductive function, including meiotic division in germ cells. Errors in meiosis can lead to aneuploidy (an abnormal number of chromosomes), which is a leading cause of birth defects such as Down's syndrome. Previous studies showed that relevant concentrations of BPA promote meiotic errors. Bisphenol-F (BPF) is a commonly used substitute for BPA. While the effects of BPF on meiosis are less clear, it is structurally similar to BPA. This experiment tested the effects of varying levels of estrogens, both natural and synthetic, on meiotic division of female mouse germ cells (oocytes). Increasing concentrations of Estradiol-17β (0, 5, 15, 30μM) were compared to a high dose (50μM) of BPA and BPF during a 17 hour culture. The oocytes were fixed for immunofluorescence analysis to assess chromosome and meiotic spindle configurations. Spindle microtubules and MTOCs (Microtubule Organizing Centers) were labeled with anti-acetylated tubulin and pericentrin, respectively, and the chromosomes with DAPI. Oocytes were analyzed using an upright fluorescent microscope. Oocytes exposed to BPA and BPF showed lower maturation rates and increased chromosome disruptions compared to controls. Chromosomal errors were highest in the BPA group, and correlated with abnormal spindle organization. Oocytes exposed to high levels of Estradiol also showed chromosomal abnormalities. These data suggest that high estrogen levels including those from estrogen mimicking compounds, such as BPA and BPF, can disrupt oocyte quality.

Comparing Metallicity Measurements from Optical Spectra of Solar-Type Stars

Paige Copenhaver, CURO Research Assistant
Dr. Inseok Song, Physics and Astronomy, Franklin College of Arts and Sciences

Metallicity (where [Fe/H] is used as a proxy) is a stellar parameter that contributes to physical characteristics of a star, and it can reveal valuable information about the star. However, historically this quantity is difficult to measure, and there are several methods to derive it that show significant discrepancies in their results. We aim to quantify the discrepancies in the metallicity measurements between iSpec values, a Python-powered automated analysis tool, and known literature values. We want to determine the reliability of iSpec in obtaining metallicity of solar-type stars. To gather the sample of stars, we selected several G-type stars for which we have known [Fe/H], temperature, and surface gravity values. We used both the iSpec synthetic spectrum method and the equivalent width method in order to determine [Fe/H] from the absorption spectra. We then compared the results with the literature values. We show that iSpec parameters agree well with previously determined values. The known values of metallicity are generally well-accepted, but it is unclear at this time which method of obtaining the parameters is the most reliable. This study finds that the iSpec tool is a potentially reliable method for determining metallicity of solar-type stars. Having more reliable metallicity measurements can tell us more about the environment in which planets form. Only stars with high metallicities are good candidates for having planetary systems, since the cores of planets are formed from metals such as iron.

Hurricane Risk Assessment of Georgia Coastal Bridges

Paul Coughlin, CURO Research Assistant
Dr. Mi Chorzepa, Environmental, Civil, Agricultural, and Mechanical Engineering, College of Engineering

The necessity of proper disaster preparedness has rarely been exemplified so well as in 2005, when Hurricane Katrina crippled the Gulf Coast and wrought over $100 billion in damage to property and infrastructure. Georgia's coastline is fortunate to have been spared the devastation of bearing the brunt of a major hurricane in recent history, but history suggests that we should be wary of developing a false sense of security. Our research intends to meticulously catalog and assess the vulnerabilities of Georgia's 560+ coastal bridges in accordance with AASHTO code, in order to more precisely inform the state where to allocate its resources in the event of a major hurricane. By

compiling both public and independently surveyed data for each bridge into a self-contained, comprehensive database, we look to determine the most critical parameters to a bridge's structural integrity in the event of a major hurricane. Once we have identified the bridges most susceptible to failure, we will run a more granular analysis to determine the most likely failure modes of each bridge and whether multiple at-risk bridges exhibit similar vulnerabilities. By diagnosing the sub- and super-structure bridge components most prone to be compromised under the forces exerted by a major hurricane, we can provide GDOT with the necessary information to mitigate risks in the short term and better prepare for disaster management in the long term.

Ethanol Production in *Pyrococcus furiosus* using High Temperature Alcohol Dehydrogenase AdhC

Alex Thomas Crowley, CURO Summer Fellow, CURO Research Assistant
Dr. Mike Adams, Biochemistry and Molecular Biology, Franklin College of Arts and Sciences

Even with energy prices lower than in the previous decade, independence on fossil fuels for energy has raised concerns over continued costs, the environmental impact of carbon emissions, and a reliance on a resource that is nonrenewable. The creation of viable renewable resources as fuel has been a continually growing field of research, and to find a cheap, efficient production method for biofuels such as ethanol has been a major goal of this research for decades. The production of significant amounts of ethanol at 95°C has never before occurred. Through the overexpression of a native alcohol dehydrogenase in the hyperthermophilic archaeon, *Pyrococcus furiosus*, ethanol was produced in significant amounts at 95°C in comparison to the control strain, which did not contain the overexpressed gene. The pathway involved in the production of ethanol in *P. furiosus* saw a sharp jump in ethanol production during the last 3 hours of a 12-hour growth experiment after low and stagnant levels of ethanol production during the first 9 hours. This jump could be a coping mechanism meant to save the cell from extreme pH levels formed by the byproducts of its normal metabolic processes. The characterization of different ferredoxin oxidoreductases and their activity in conjunction with a native alcohol dehydrogenase show new relationships in this process that differ greatly at different temperatures, and the addition of a carbon monoxide dehydrogenase enzyme improves the yield of ethanol at 90°C in this system.

An Exploratory Investigation: Examining the Current and Future Prospects of Organizational Use of Business Process Management Tools and Technology

Fernando Arturo Cruz
Dr. Dave Chatterjee, Management Information Systems, Terry College of Business

This exploratory paper covers the current iteration and future prospects of Business Process Modeling Notation (BPMN) through analyzing a shift in its fundamentals and an aggregation of functions. First, Value-Driven BPM (VBPM) builds upon the previous BPMN practices by focusing on giving priority to processes that generate the greatest utility. VBPM includes three sets of tradeoffs: Efficiency or Quality, Agility or Compliance, and Integration or Networking. Although professionals continue to use BPMN for its routinization, the continued sacrifice of quality and agility reduces firm differentiation. Furthermore, businesses have been embedding Knowledge Management (KM) into BPMN fundamentals to maintain their competitive advantage. This theoretical combination creates a knowledge-intensive process that converts unstructured data to organizational wisdom. A diverse array of platforms using this methodology have expanded their functions from simple process modeling to complete implementation of automated systems. BPMN operates in two major domains, modeling and execution, while tools vary in interface and capabilities. A BPMN tool requires competency in four areas: BPMN compliance, syntax inspection, interoperability, and process executions. A brief qualitative investigation in this paper reveals a wide range of programs offering competency in all areas but with unique user focus and interface. In conclusion, BPMN supports interdisciplinary collaboration for business and technical professionals by offering a set of agile design principles coupled with a robust marketplace of modeling software.

Neutrophil Extracellular Trap Induction Dependence on Flagellar Motility

Christian Chandler Cullen
Dr. Balazs Rada, Infectious Diseases, College of Veterinary Medicine

Cystic fibrosis (CF) is a disease caused by a mutation in the cystic fibrosis transmembrane conductance regulator (CFTR) anion channel, resulting in severely impaired mucociliary clearance in the airways leading to chronic bacterial infections. *P. aeruginosa* exhibits a unique resistance to airway mucus and has become a common pathogen within airways. Despite the large-scale neutrophil recruitment in the airways, neutrophils fail to clear *P. aeruginosa* in CF. Instead, neutrophils release extracellular traps (NETs) composed of granule cargo and DNA into the airway lumen causing tissue damage. *P. aeruginosa*-induced NET formation occurs in CF airways and offers a likely mechanism for neutrophil-mediated lung damage. Previously, we have shown that bacterial flagellum is essential for planktonic *P. aeruginosa* to induce maximal NET release. Recently, we found that bacteria with motile flagellum trigger significantly more NET release than *P. aeruginosa* with immotile flagella. To gauge the role of flagellar structures, we tested 22 mutant strains of *P. aeruginosa* deficient in several of the motor genes moving the flagellum (motAB, motCD). Our results showed that deletion of both motility islands is needed to entirely eliminate flagellar motility-induced NET release in *P. aeruginosa*. However, partial deletion mutants revealed that the motAB island is more potent. From our work, we propose that bacterial motility is the primary virulence determinant responsible for triggering NET formation by enabling *P. aeruginosa* and neutrophil encounters. Our work adds to current literature by distinguishing bacterial motility machinery and proposes to target proteins driving flagellar motility as CF therapeutics.

Judicial Politics in the Obama Era

Bryson Culver, CURO Honors Scholar, CURO Research Assistant, CURO Summer Fellow
Dr. Susan Haire, Political Science, School of Public and International Affairs

The Federal Judiciary acts as an independent and apolitical body; however, in an era of growing partisanship, it is not immune from political influence. Looking at the Federal Appellate Courts, this project has determined that the voting behavior of judges aligns with the party of their nominating presidents. The researchers used thirty randomly selected cases from every Circuit from the years 2009-2012 and coded the judges' votes as either conservative or liberal. From this analysis, the researchers were able to determine that the presidential cohorts of judges voted more conservatively if the nominating president was a Republican and more liberally if the nominating president was a Democrat. Over time, the judges have become more moderate as cohorts of older presidents (Carter, GHW Bush, Clinton) are more polarized in comparison to the more recent presidents (GW Bush, Obama). The project also looks at change in circuit composition under Obama. In 2008, only one Circuit had a majority of democrat appointed judges. By 2016, eight of the twelve Circuits became majority democratic appointees. Additionally, every single Circuit gained a larger proportion of minority and female judges. The researchers found the composition to be important as judges' voting behavior was directly affected by the composition of the panel they sat on. The presence of a conservative judge on a panel increased the likelihood of liberal judges to vote conservatively. Additionally, in cases involving gender or racial issues, the presence of a minority or woman on the panel affected the outcome of the decision.

Design of a High Speed Water Tunnel and Associated Instrumentation

Haynes Curtis, CURO Research Assistant
Dr. Ben Davis, Environmental, Civil, Agricultural, and Mechanical Engineering, College of Engineering

High-speed water tunnels are used to visualize the fluid flow around submerged bodies as well as study the corresponding hydrodynamic forces. Due to the extreme costs involved with purchasing a water tunnel from a commercial manufacturer, it was decided that a water tunnel would be designed and built in-house with the assistance of the UGA Instrument Shop. The goal of this study was to research the critical design aspects of water tunnels and their instrumentation

through literature review and site visits to existing tunnels. Additionally, one of the most fundamental pieces of tunnel instrumentation, a force balance, was designed for in-house fabrication alongside the water tunnel. The force balance will be used to measure lift and drag forces imposed on object tested in the water tunnel. It is expected that the high-speed water tunnel will be installed in the Dynamic Devices and Solutions Lab in the College of Engineering during the spring 2017 semester.

Histological Comparison of Various Coccidial Control Programs Used in Commercial Poultry

Ebun Dada
Dr. Susan M Williams, Population Health, College of Veterinary Medicine

Coccidiosis has been deemed the biggest parasitic threat to commercial poultry throughout the world and is caused by the protozoan *Eimeria*. To control the internal spread of the bacteria in chickens, traditional anticoccidial routes such as antibiotics and vaccinations have been implemented. Since chickens are a major contributor to modern consumer diets, it is necessary for the routine maintenance and clinical assessment of the gastrointestinal tract health of chickens. In the past decade, consumers have demanded more organic substitutes of coccidia control in the feed of chickens by removing in-feed antimicrobials. The shift from synthetic to organic means of control has not only been prompted by consumer demands but also biologically, as the extensive use of anticoccidial drugs has resulted in the emergence of drug-resistant coccidian strains. Examination of coccidia severity levels, and histological examinations were carried out within the gastrointestinal tract of birds during a 6-week treatment coccidiostat/antibiotic alternative trial. There was a systematic distribution of chickens where one bird per pen, from six pens per treatment, was examined weekly. These birds were either given a coccidiostat with some form of additives such as an antibiotic or the organic seed, weed, and feed option or a vaccination with the same type of additive. With our data, we observed the difference in coccidia severity levels in each treatment and, as expected, we saw greater severity levels in chickens given the antibiotic and growth promoter compared to that of the organic option. By the end of the study, it was concluded that the seed, weed and feed program did, in fact, result in lower severity levels of coccidia expression.

Effects of *Plasmodium falciparum* Derived Hemozoin on Expression of Inflammatory and Coagulation Factors in BeWo Cells

Trisha Dalapati, Foundation Fellow
Dr. Julie Moore, Infectious Diseases, College of Veterinary Medicine

Plasmodium falciparum infection during pregnancy, which commonly progress into placental malaria (PM), is estimated to cause over 200,000 infant deaths annually. PM is characterized by sequestration of parasite-infected red blood cells (iRBCs) in the maternal space of the placenta. Pathogenesis is additionally marked by aberrant inflammation, adversely affecting nutrient and gas exchange in the syncytiotrophoblast, the outermost multinucleated cell layer of the placenta. Alongside inflammation, increased expression of tissue factor (TF) leads to activation of the extrinsic coagulation cascade and subsequent blood clotting. PM has been marked by excessive clotting, leading to low fetal birth weight and growth restriction. Protease activated receptors including PAR-1 and PAR-2 may be involved in positive feedback of inflammation and coagulation. Although inflammation and coagulation are often viewed separately, activation is concurrent. Because the pathology of PM remains ambiguous, quantifying gene expression of inflammatory and coagulation factors may provide essential mechanistic information. BeWo, a choriocarcinoma cell line, was used as an in vitro model to mimic in vivo host-parasite interactions. After reaching proper confluency, BeWo cells in duplicate samples were syncytialized and stimulated using lipopolysaccharide (LPS) or hemozoin. LPS, the positive control, is found on the outer membrane of gram-negative bacteria and elicits immune response. Hemozoin is the primary parasite by-product from the digestion of hemoglobin. After stimulation, cells were scraped at various time points for RNA isolation, cDNA generation, and real-time PCR. Three genes were chosen for study: TF, PAR-1 and PAR-2. Analysis

of gene expression of these targets will provide insight into inflammatory and coagulation responses during PM.

Structural Analysis of a Predicted Skp1 Glycosyltransferase PuGT8A

Nitin Daniel, CURO Research Assistant
Dr. Christopher M West, Biochemistry and Molecular Biology, Franklin College of Arts and Sciences

Toxoplasma gondii (*Tg*) is an obligate apicomplexan parasite that can infect most warm-blooded animals. It uses a pathway that includes the glycosylation of the Skp1 Cullin-1 Fbox E3 ubiquitin ligase complex resulting in a pentasaccharide that is thought to aid the parasite in cell cycle regulation. The Skp1 complex in the model organism *Dictyostelium discoideum* is hydroxylated by PhyA and modified by glucosyltransferases GnT1, PgtA and AgtA. The Tg Skp1 hydroxyproline is modified by a similar mechanism and addition of the sugars is carried out by homologs of GnT1 and PgtA, but the last two sugars are added by GT32A and GT8A. This was unexpected because GT8A was previously predicted to encode a glycosyltransferase (glycogenin) critical for initiation of glycogen synthesis. To understand the relationship between GT8A and glycogenin, a structural study was initiated. After crystallization efforts of TgGT8A were unsuccessful due to poor diffraction, a homolog from the plant pathogen *Pythium ultimum* was chosen as an alternative candidate based on its sequence similarity to TgGT8A. Here we express the PuGT8A plasmid in *E. coli*, purify it using an IMAC column, and show its predicted activity as an alpha-galactosyltransferase through a radioactive assay. PuGT8A crystals were diffracted in an in-house X-ray generator and a diffraction pattern was obtained. Studies are ongoing to solve its 3-D structure. Structural studies on the glycosyltransferases that modify Skp1 are expected to help us understand the mechanism of their regulation, which in turn might lead to new opportunities for parasite control.

Analyzing TGF- ß Regulation of the Progenitor Motor Neuron/Motor Neuron Glial Fate Switch

Tarun Daniel, Foundation Fellow
Aditya Sood
Dr. Steven Stice, Animal and Dairy Science, College of Agricultural and Environmental Sciences

In the developing primitive spinal cord, termed the neural tube, motor neuron progenitor cells (pMN) undergo a temporal change in potency, first generating motor neurons (MN) and later, oligodendrocyte precursor cells (OPC). Oligodendrocyte transcription factor 2 (Olig2) is a critical fate determinant central to this fate switch. In vivo, Olig2 promotes self-renewal, and primes cells for neurogenesis, ultimately resulting in the generation of MN while maintaining a subset of undifferentiated pMN. pMN then co-express the transcription factor homeobox protein Nkx2.2 alongside Olig2, which together drive much of the genetic glial machinery, marking the initiation of oligodendrogenesis. The underlying mechanism(s) involved in this fate switch, namely the transcription and expression of Nkx2.2 in pMN, are poorly understood. Previous studies suggest that a soluble, secreted transforming growth factor beta (TGF-β) family protein can regulate similar neural progenitor fate switches. Sonic hedgehog (Shh), a morphogenic inducer of both Olig2 and Nkx2.2 transcriptions, is also an important component in driving this initiation event, though alone it is insufficient in triggering glial initiation. Using an in vitro, pluripotent stem cell (PSC)-based model of neural tube development, we hypothesize that TGF-β primes pMN for the glial fate switch by altering the post-transcriptional state of Olig2. Further, we expect Shh to drive Nkx2.2 transcription. Ultimately, our studies will aid in developmental and disease modeling, stem cell manufacturing, drug and toxicity testing and regenerative medicine.

Recycled Crumb Rubber for Use in Concrete Barrier Walls and Other Applications

Grace Hays Darling, CURO Research Assistant
Dr. Stephan A Durham, Environmental, Civil, Agricultural, and Mechanical Engineering, College of Engineering

As the availability and storage area of landfills diminish, there is an increasing demand for finding new methods to incorporate recycled

materials into construction applications. The recycled material of interest for this study is rubber tires. Concrete safety barriers are one of the widely used impact reducers that are intended to either decelerate vehicles to a safe stop or redirect them away from a fixed object. Concrete barriers constructed by GDOT consist of a Class A concrete mixture design (3000 psi). A benefit for using recycled rubber in concrete barrier applications would be the possible reduction in materials cost. GDOT has not conducted any studies about the use of rubber tires in concrete barrier walls or any other application. This research project will involve extensive review of literature related to the use of recycled rubber tires, predominantly crumb rubber, in transportation applications. Crumb rubber is shredded recycled tire scraps consisting of only rubber that becomes granular in size. In this study, the fine aggregate component of concrete will be substituted with incremental proportions of crumb rubber. The intention of this study is to determine a concrete mixture with crumb rubber inclusion that is feasible without any significant disadvantageous effects on the concrete's structural performance. The compressive strength of the crumb rubber concrete mixtures will be tested at 1, 7, and 28 days of age to measure their mechanical performance as the crumb rubber substance increases. Ultimately, the data gathered from this study will be utilized in further phases of a larger-scale research analysis.

Privileged Perception: An Examination of Supersensory Insight in Vladimir Nabokov's *The Gift*

Anna Jewell Davidson
Dr. Charles Byrd, Germanic and Slavic Studies, Franklin College of Arts and Sciences

As one of the greatest achievements of Vladimir Nabokov's career, *The Gift* reveals the possibility of connecting with a world otherwise unseen and undetected. Such supersensory insight is the defining gift of the novel's hero, Fyodor Godunov-Cherdyntsev, in his attempts to achieve recognition as a writer despite continuous criticism by the outside world. As a result, Fyodor reveals his supersensory insight to no one except in covert statements that largely go unrecognized. This presentation examines Fyodor Godunov-Cherdyntsev's supersensory insight and the factors contributing to its presence in *The Gift*. We will first draw upon the ideas of the French philosopher and Nabokov's invented man of wisdom, Pierre Delalande, for greater understanding of supersensory insight followed by evidence of its existence in Fyodor. We will then explore evidence of supersensory insight in one of Fyodor's few literary supporters, Aleksander Yakovlevich Chernyshevski (the namesake of the renowned author and philosopher). We will later analyze the Kirghiz story told to Fyodor by his late father in which supersensory insight is a supreme influence. The final subject of analysis will be the novel's concluding paragraph and its relation to Aleksandr Pushkin's *Eugene Onegin*. Through Fyodor's experience, Nabokov teaches us to not only seek awareness of things beyond our own human comprehension but also to be slow to rebuke those who claim to understand things we do not. We are compelled to ask ourselves how often we value objects with mere temporary worth while rejecting those that are much more significant and invaluable.

An Investigation of Environmental Variable and Dispersal Patterns of North American *Photinus* Fireflies

Brandon Davis
Dr. Kathrin F Stanger-Hall, Plant Biology, Franklin College of Arts and Sciences

Among the genera of North American fireflies, the genus *Photinus* is the most diverse, with over 40 different species. The distribution of *Photinus* species across North America varies greatly, and little is currently known that can explain these observed distributions. This research study utilized state and county records for 36 North American *Photinus* species, which were collected over the last 50 years. All county coordinates (longitude and latitude) with observed *Photinus* species were entered into ArcGIS, a sophisticated geographic mapping program, and were used to test hypotheses on the influence of different environmental variables (average annual precipitation, soil composition, elevation, and average annual temperature) on species distribution. Insights from this study will be important in identifying key characteristics of *Photinus* habitats. Furthermore, this investigation may identify important habitats for conservation of *Photinus* fireflies across North America.

Abstracts

Gender Differences in College Students with ADHD

Samantha Delaney, CURO Research Assistant
Shruti Prathip
Dr. Jason Nelson, Psychology, Franklin College of Arts and Sciences

Limited empirical research investigating the subject of gender differences in attention-deficit/ hyperactivity disorder (ADHD) provides evidence for under-identification of ADHD in females. This poses a significant concern, as women with ADHD demonstrate significantly higher levels of other mental health comorbidities when compared to non-ADHD females. This study sought to contribute to the available research by examining potential gender differences in first-time ADHD diagnosis in college, ADHD subtypes, hyperactive-impulsive symptoms across the lifespan, and treatment-seeking behavior. Participants included 589 students pursuing postsecondary education who were diagnosed with ADHD using multi-method, multi-informant evaluations. The gender distribution was 51.4% male (n=303) and 48.6% female (n=286). Archival data from evaluations leading to the ADHD diagnoses were used for the analyses. Self-report and parent-report ratings were used to measure ADHD symptoms. Females were more likely than males to be initially diagnosed with ADHD in college. Females were not more likely to be diagnosed with inattentive type ADHD, though self-reported inattentive symptoms were significantly higher in females in adulthood. Females were more likely to present with comorbid anxiety and mood disorders. While females were also more likely to have attended therapy in the past, differences in stimulant usage between males and females were insignificant. Findings provide evidence that ADHD in females is more likely to be under-identified in childhood. Given empirical findings that males and females are both likely to experience significant impairment associated with ADHD, there may be reason to modify the approach in which practitioners identify the disorder.

Testing Immune Function in Naked Mole Rats During Periods of Wound Healing

Madison Demetry
Dr. Vanessa Ezenwa, Ecology, Odum School of Ecology

Typically, when an animal is wounded, the skin regenerated is characterized by abnormal collagen patterns and lack of hair follicles. Some species, such as *Acomys kempi*, can regenerate skin characterized by normal collagen patterns, both skin layers, and the presence of hair follicles. In animals where skin-regeneration is possible, it has been proposed that a biological trade off exists between immune system function and complete regeneration. I investigated by testing the innate bacterial killing capacity of non-regenerative animals and comparing it to data previously collected on the killing capacity of regenerative species living in the same habitat. By comparing the killing capacity of pre-wounded Naked Mole Rats (*Heterocephalus glaber*) to the killing capacity of four other species, I found that *H. glaber* had a killing capacity that fell between that of regenerative species (*A. kempi*, *A. percivali*) and non-regenerative species (*Myomyscus brockmani*, *Mus musculus*). Additionally, I found that the killing capacity of *H. glaber* significantly decreased 24 hours after wounding. Because *H. glaber* does not possess regenerative properties, it was expected that the killing capacity of this species would have been relatively close to that of other non-regenerative species. Interestingly, results instead indicated that the killing capacity of *H. glaber* (12%) was closest to one of the regenerative species, *A. percivali* (17%). This result could be contributed to many different factors, such as hyaluronic acid levels or fibroblast properties specific to Naked Mole Rats.

Investigating Genes Implicated in Ciliogenesis Using CRISPR/Cas

Kaley Ann Desher, CURO Research Assistant
Dr. Jonathan Eggenschwiler, Genetics, Franklin College of Arts and Sciences

Cilia, the hairlike organelles that project from the surface of eukaryotic cells, play several critical roles such as sensing the extracellular environment, cell signaling, and embryonic development. Disruption of these processes can lead to ciliopathies that compromise human health. Alpha-TAT1, Bbs8, Ick/MRK, Ift122, and Kif7 are all ciliary proteins implicated in

ciliogenesis that have undetermined functions. We generated reversible mutations in each of these genes using the CRISPR/Cas9 genome editing system and a Cre-LoxStopLox (LSL) transcriptional cassette containing the puromycin resistance gene. We also cloned a LSL/RFP/homology sequence cassette for each gene that will be utilized to generate double mutants. We plan to PCR screen our mutants, and then conduct phenotypic analysis to discover each gene's unique role in ciliogenesis.

The Effect of Litter Leachate from Fresh Riparian Rhododendron Leaves on Microbial Respiration in Headwater Streams in the Southern Appalachians

Desirae Ann Dickerson, CURO Research Assistant
Dr. Catherine Pringle, Ecology, Odum School of Ecology

This project aims to study the effect of fresh leaf litter leachate from Rhododendron on microbial respiration in headwater streams. When Rhododendron leaves decompose they release a mixture of labile and refractory organic compounds into the stream. This leaching process can take up to two months depending on the type of dissolved organic compounds (DOC) contained within the leaves. Microbes use mostly labile compounds for growth and energy whereas refractory compounds are harder to use and can inhibit microbial growth. As part of a USFS-LTER Rhododendron Removal Project, one treatment/management strategy involved cutting Rhododendron along a stream reach and leaving the cut branches and leaves within the stream for several months before burning. The leachate from these fresh Rhododendron leaves may negatively affect the microbial community in that stream, depending on the amount and quality of leachate compounds released. We hypothesize that: (1) the compounds found in Rhododendron over time will be more labile in the beginning and more refractory towards the end of the 5-week experiment; (2) microbial respiration will decrease over time in response to exposure to more refractory Rhododendron leachate; and (3) as leachate concentration increases, microbial respiration will decrease. This project is planned to be complete by April 2017 and we will combine our completed analyses of microbial respiration with chemical analyses of Rhododendron leachate to address our hypotheses.

Tolak Reklamasi: Rejecting Tourist Developments in Bali

Sarah Jane Dillon, CURO Research Assistant
Dr. J. Peter Brosius, Anthropology, Franklin College of Arts and Sciences

Bali is currently experiencing a massive growth in tourism and development that is affecting the culture, politics, and economics of the island. This influx of large-scale developments has caused unbalanced water access privileging tourists and created other environmental costs that are causing serious problems experienced throughout Bali. In response to this situation, a protest movement, called the *tolak reklamasi* or "reject reclamation" movement, has grown quite popular island-wide. Large developments created specifically for tourists are not new in Bali, but island-wide protest has only been occurring relatively recently. The factors that play into these current mass protests are varied; however, my thesis states that the main causes are the way land is viewed through Balinese cosmology; the history of the Indonesian genocide and its effect between generations; the historical and symbolic importance of the ritual, royal, and mass suicides that occurred in 1906 and 1908; the perception of cultural attacks Balinese feel are coming from Jakarta; and the confluence of environmental issues that such developments have already caused. I will assess each of these factors through a detailed scoping of the appropriate literature, and eventually on-site research in Bali. I anticipate that my findings will show that my hypothesis encompasses the root factors of why the *tolak reklamasi* movement is growing in popularity now. This research will also address an oversight in anthropological work, because, despite the importance of *tolak reklamasi* to the Balinese and to future developments in Bali, there is very little anthropological analysis on this subject.

An Empirical Analysis of Economic Influence on Election Outcomes

Emil Dmello, CURO Research Assistant
Dr. Nikhil Srinivasan, Management Information Systems, Terry College of Business

The United States has undergone a divisive election that has answered several questions, but has left more unanswered. One of these questions that political scientists and historians have continuously debated is the significance of economic variables on general election results. Historians postulate that economic conditions outweigh the quality of candidates, while political scientists stipulate the opposite. This debate can be distilled down to whether political fortunes are determined by great people or involve great circumstances. My research examines this dichotomy by assessing the significance of economic influences on the political fortunes of the two major parties in the US. I will collect economic data and perform Poisson regressions to assess whether economic variables influenced changes in representation within the House of Representatives and the Senate. As my response variables on Congressional representation are discretely valued, Poisson regressions are employed for continuous-discrete pairing analysis. Since Poisson regression assumes there is mean-variance equivalence within the response data, its assumptions must be validated prior to analysis. While traditional evaluations of this question may involve the least-squares model, I believe the Poisson regression can help us understand the driving forces in a discrete fashion. My research aims to determine if macro-level economic indicators such as unemployment and inflation, as well as subjective economic indicators including measures of economic anxiety, the Gini-coefficient, and measures of social mobility, influence election outcomes. Based on my research, I hope to highlight the role of personal charisma versus economic circumstance in defining the priorities of voters.

Jamming Avoidance Response: An *Eigenmannia* Phenomenon

Phiet T Do
Luis Perea
Dr. Mable Fok, Electrical and Computer Engineering, College of Engineering

The *Eigenmannia* is a species of South American fish that features the ability to perform a Jamming Avoidance Response - JAR. This electric fish uses electrical discharge pulses to sense its environment through electroreception. When the fish comes into contact with another gymnotiform electric fish producing an electrical discharge at a similar frequency, it results in destructive interference of the two discharges causing the electroreception to be distorted. Evolutionary modifications have occurred so that the two fishes employ a neural circuit behavior to avoid each other's specific frequency, restoring their respective electroreception. The objective of this research is to understand how the electrosensory lateral line lobe and the neural pathways interact to perform this neural behavior. There have been different, competing theories to explain the jamming avoidance response; for example, one theory emphasizes asymmetric amplitude, while another emphasizes on phase differences of the signals. In an attempt to simulate the *Eigenmannia* phenomenon, our biological model will consist of pass band filters, logic gates, a switch module, and a feedback control system. Applying this knowledge will help us begin prototyping a photonic and electrical circuit to replicate the jamming avoidance response, as we believe it has the potential to revolutionize radio communication.

Beyond-Design Basis Evaluation of Georgia Coastal Bridges

Adara Dodson, CURO Research Assistant
Dr. Mi Chorzepa, Environmental, Civil, Agricultural, and Mechanical Engineering, College of Engineering

The evaluation of existing bridge drawings to determine critical bridge parameters necessary for hurricane vulnerability evaluation and the development of a load-capacity assessment procedure are the objectives leading the "Vulnerability Evaluation of Georgia Coastal Bridges" research project. To gather necessary criteria, two procedures must be completed. Initially, critical bridge components and bridge drawings are assessed as part of a Georgia Department of Transportation project. This assessment includes identifying significant bridge details and gathering them in a logical format for future uses. Subsequently, the research data gathered is used to develop a load-capacity assessment procedure for beyond-design basis hurricane categories (e.g., Category 4 or 5). During my semester of contribution, as well as the previous years' work on the project, the necessary bridge drawings were reviewed and the first phase

was considered complete. Currently, the vulnerability assessment of coastal bridges is underway in order to evaluate reliability of Georgia coastal bridges under, beyond-design basis, hurricane loads.

Relationships and Trade Offs between Food Insecurity and Healthcare

Jacy Donaldson, CURO Research Assistant
Dr. Abigail Borron, Agricultural Leadership, Education, and Communication, College of Agricultural and Environmental Sciences

Every day, there are people who struggle due to instability in their life. Survival often requires tough choices regarding food, health, shelter, education, and other daily needs. When focusing on one area, such as food insecurity, making ends meet through to the end of the month can be identified through varying resources for assistance. However, when food insecurity intersects with health-based concerns, an increasingly complex set of issues arise. This research project focuses on the tradeoffs and unique characteristics between food insecurity and health care. The majority of literature focuses on how food insecurity increases the need for health care due to health issues related to poor nutrition. While this is important, there is also an opportunity to consider how food insecure families perceive and deal with weighing the options between food and health care needs. The target population for this study is individuals utilizing food pantries in and around Atlanta, Georgia. Using qualitative research methods such as focus groups, in-depth interviews, and photovoice, we will gather information about people's choices regarding food insecurity and health from their own perspective. Couched in a larger multi-disciplinary project, this research will focus specifically on the intersection of food and health when analyzing the data. The findings will contribute to developing a more comprehensive understanding of this complex intersection, which is intended to inform the Atlanta Community Food Bank, as staff consider potential interventions for assistance at the agency level.

Development of Viscosity-Sensitive Fluorescent Molecular Rotors for Food Additives

Kevin Tuan Dong, CURO Research Assistant
Dr. Mark A Haidekker, Electrical and Computer Engineering, College of Engineering

Fluorescent molecular rotors are being utilized more for their probing properties; they are reporters of fluid viscosity with the major advantage of ultrafast measurement in extremely low fluid volumes compared to conventional mechanical rheology. Among many applications, some being the examination of microviscosity in the cell membrane of blood plasma and macromolecule suspensions, the rotors can be applied to food additives. In these applications, however, a substance's autofluorescence critically interferes with the fluorescent emission of the molecular rotor. Our investigation aimed at determining a method to separate this spectral emission interference, in our case, with wort solutions. Preliminary experiments with stained (with rotors) and unstained fluid samples showed that it was impossible to separate this autofluorescent interference. It was hypothesized that additional factors such as poor solubility of the rotor, viscosity sensitivity, or even temperature could also play a role. We proceeded by synthesizing a series of molecular rotor derivatives, containing a naphthalene core, as derived from the benzylidenemolonitrile motif. These rotors exhibited a strong bathochromic shift with an emission peak at 660nm (red). At this wavelength range, the contribution from the autofluorescent emission should be negligible. With this shift, however, viscosity sensitivity was reduced. Further experimentation and development is needed to improve the rotational freedom of the rotor to increase the dye's sensitivity.

The Ratio of Gas to Dust at High Galactic Latitudes

Jessica E Doppel, CURO Research Assistant
Dr. Loris Magnani, Physics and Astronomy, Franklin College of Arts and Sciences

The ratio of the column density of atomic Hydrogen (N(HI)) and the color excess (E(B-V)) varies over the different studies that have examined the ratio. Using the data from the Leiden/Argentine/Bonn (LAB) survey and the Schlafly et. al. color excess survey, the values of the column density and the color excess are

plotted against each other for specific points in the sky to determine the N(HI)/E(B-V) ratio. From these data sets, the value of the ratio has been determined to be $N(HI)/E(B-V) = 3.2 \times 10^{21}$ mag^{-1} cm^{-2}. It is anticipated that the N(HI)/E(B-V) ratio will be dependent on distance, region of the galaxy, and the technique through which the quantities are determined. This study sets out to both understand the differences in this value between this research and previous work and to tighten the understanding of the ratio of gas to dust in various regions of the galaxy, particularly at high latitudes ($|b|<20°$) using these newer, higher resolution data sets. The determination of a reliable relation between the gas and dust would allow for identifying and mapping molecular and atomic clouds in regions of the sky that have not yet been surveyed.

A Comprehensive Assessment of Cognitive and Motor Functional Outcomes After Traumatic Brain Injury in a Porcine Model

Neil Doshi
Dr. Franklin Delano West, Animal and Dairy Science, College of Agricultural and Environmental Sciences

Traumatic brain injury (TBI) is a leading cause of death and permanent disability in the United States. Children between the ages of 0-4 years are at the highest risk of sustaining a TBI and are also the most likely to suffer cognitive and motor function deficits as a result of their premature neurological development. Currently, there is no effective treatment for TBI. Due to their similarities in neuroanatomy and physiology to humans, pigs may serve as a successful animal model for treatment development. The present study assesses changes in cognition and motor function in a piglet traumatic brain injury model. We hypothesize that TBI in a piglet model will elicit measurable deficits at the functional level, evident through changes in cognition and motor function. A spatial T-maze test was utilized to assess the spatial memory aspect of the piglets' cognition. Additionally, gait analysis was conducted to observe changes in the piglets' spatial-temporal gait biomechanics. The TBI piglets navigated the spatial T-maze slower than their sham counterparts ($p<0.05$) and made more ($p<0.05$) mistakes during the acquisition phase of testing. Interestingly, injured piglets saw a significant recovery in many gait parameters by the end of this longitudinal study. Key insights into TBI deficits garnered from this study will form the necessitous basis of all future treatment development studies for monitoring improvements in cognition and biomechanics.

A Comparison of the 2014 Scottish Referendum and 2016 European Union Membership Referendum Campaigns

Samuel Driggers, CURO Honors Scholar, CURO Research Assistant
Dr. Cas Mudde, International Affairs, School of Public and International Affairs

In the developed world, the United Kingdom has perhaps received the most attention for its nationalist, autonomist, and secessionist movements. Several UK political parties seek greater regional autonomy, and some advocate disunion from the European Union or UK based on: 1) frustration with political, cultural, and economic marginalization, 2) the strengthening of national identity, and 3) rights of self-determination. Composed of four distinct nations, and as member of an economically and politically powerful international organization, the UK is plagued by questions concerning its concentration and divisions of political sovereignty. In attempt to preserve political rights and to appease vocal segments of its populace, the UK Parliament continually allows constituents to vote in referendums which direct how the UK's sovereignty is divided and concentrated. The most recent referendums, the 2014 Scottish Referendum and 2016 EU Membership Referendum, had focal campaigns resulting in high voter turnouts and close percentage splits. By comparing the traditional nationalist movement in Scotland to the unconventional nationalist movement surrounding the EU Referendum, this project attempts to draw parallels between sovereignty-seeking movements within states and international organizations. Additionally, this comparison attempts to support the idea that movements need not seek traditional ideas of independence to be categorized as nationalist. Furthermore, comparison of each referendum's campaigns will further the understanding of nationalist movements, questions of political

sovereignty, and simultaneous trends of political integration and disunion. This project began with a review of literature on nationalist, autonomist, and secessionist movements before proceeding to comparison of campaign materials, speeches, and actions.

Reprogramming Mouse Embryonic Fibroblasts via Induced Expression of *Foxn1* and *Foxg1* Transcription Factors to Generate Induced Thymic Epithelial Cells (iTECs)

Lauren Dunavant
Dr. Brian Condie, Genetics, Franklin College of Arts and Sciences

The CRISPR/Cas9 system has revolutionized the field of genetics by allowing direct modification and regulation of genomic regions of interest. In this study, re-engineered versions of this system (subsequently referred to as CRISPR/dCas9), which are gRNA-directed but have nullified nuclease domains, were used to activate endogenous genes in mouse embryonic fibroblasts (MEFs). The goal was to generate induced thymic epithelial cells (iTECs) to mimic the function of TECs that naturally form a thymic microenvironment essential for T cell maturation. The *Foxn1* and *Foxg1* genes (of the Forkhead box protein family) are critical in early thymic development and were activated via transfection of MEFs with CRISPR/dCas9 systems and site-specific gRNA sequences. Multiple CRISPR/dCas9 systems were used, including a p300-dCas9 plasmid, a SP-dCas9-VPR plasmid, a TetO-FUW-VdC9BV plasmid, and a humanized VP64 dCas9-GFP plasmid. Various gRNAs were also tested to optimize activation, and resulting gene expression profiles were compared to those of iTECs generated from cre-activated transgenic mice. Current data shows that the p300-dCas9 plasmid-treated cells showed an approximate 10-fold increase in *Foxg1* expression (compared to an internal control), although further optimization may be required. Screening of the SP-dCas9-VPR, TetO-FUW-VdC9BV, and VP64 dCas9-GFP plasmids also gave strong evidence that the SP-dCas9-VPR plasmid may effectively activate both *Foxn1* and *Foxg1*. Research is ongoing, but if activation of these FOX proteins results in repeatable reprogramming of MEFs to iTECs, these results may have serious implications for the future of regenerative medicine, including treatment options for chemotherapy-related immune deficiency, autoimmune disorders, and age-related thymic involution.

The Effectiveness of Financial Education Mandates in Georgia Public High Schools

Ana Duron-Fleck, CURO Honors Scholar, CURO Research Assistant
Dr. Brenda Cude, Housing and Consumer Economics, College of Family and Consumer Sciences

In the state of Georgia, public high school students are required to take an economics course with a personal finance section in it in order to graduate from high school. Students are tested on their knowledge and take an exam worth 20% of their final grade. Last year's focus of this study was on the effects of this class on the students' financial behaviors. However, this year we are focusing on the class's overall effectiveness and its impact on students' financial literacy skills by asking students basic questions constructed to gauge their knowledge of personal finance. We distributed a 31 question survey via email to all freshmen in attendance at the University of Georgia. The questions ranged from the student's gender and major to questions about their savings accounts and knowledge of interest rates. Using the responses from students who graduated from Georgia public high schools, we limited our analysis to only those students that recall taking the course and identified the proportion that answered the financial literacy questions correctly. Through the use of different combinations of questions and answers we were able to determine if the style and medium of class affects what the student learned and if it changed how the student answered the financial literacy questions. We hope to find that students who took a standalone course covered more content than those who took a course only in part about personal finance/money management.

Atlanta, Race, and Housing: Racial Segregation in the Context of the Great Recession

Caskey Dyer

Dr. Steven Holloway, Geography, Franklin College of Arts and Sciences

The subprime mortgage crisis of 2007-2008 resulted in foreclosures, major losses of capital for financial institutions, and losses of equity for hundreds of thousands of homeowners. These effects were not evenly distributed. In the years leading up to the crisis, the subprime loans which so toxified lender's asset sheets were disproportionately given to lower-income, minority households. The causes for this are multifold - explicit mandates given by the federal government, implicit practices normalized by government-sponsored enterprises, and pre-existing practices of racial and class discrimination on the part of lenders combined to produce an environment in which discriminatory lending became institutionalized in the name of profit and growth. This paper will examine the degree to which these practices re-constituted historical socio-spatial racial and class divisions by focusing on the Atlanta metropolitan area, where historical racial segregation has been produced and re-produced across the decades, through similar governmental and financial lending practices. I will give a history of socio-spatial racial segregation in Atlanta and its suburban counties, focusing on how state and private actors managed to produce these conditions, before using data on housing and lending practices across the region to analyze if, and how, these divisions became re-created on a larger scale. I will end with a critical analysis of how the reality of these divisions contrasts with dominant narratives of growth in the context of a supposedly post-racial state and a globalized economy, before discussing the potential dangers of the post-Recession lending environment.

Characterization of a V-H+-ATPase in *Toxoplasma gondii*

Eric Dykes, CURO Research Assistant
Dr. Silvia N J Moreno, Cellular Biology, Franklin College of Arts and Sciences

Toxoplasma gondii is an apicomplexan parasite that causes chronic infection in humans through inadvertent consumption or contact with infected cat feces or undercooked meats. As many as 2 billion people are infected with this parasite worldwide, most of them unaware of their chronic infection. The available drugs used to treat the infection are only effective against the fast growing tachyzoite. We believe that it is critically important to understand better the physiology of *Toxoplasma* to discover better ways to block its lytic cycle, which is linked to pathogenesis. We are interested in proton transport and homeostasis and we are characterizing a vacuolar ATPase that localizes to both the plant-like vacuole (PLV) and plasma membrane of *T. gondii*. Vacuolar ATPases create proton gradients by coupling the hydrolysis of ATP with the pumping of protons across the membranes of vacuoles in cells. These pumps create a proton gradient, which can be used to exchange for ions or to maintain the membrane potential. We believe that *T. gondii* relies on proton gradients to help regulate such cellular functions as ion homeostasis, pH homeostasis, and membrane potential. Using conditional knockdowns, we are studying the physiological functions of this vacuolar ATPase; we will measure intracellular pH, proton extrusion, and the membrane potential of the vacuolar ATPase knockdowns. We believe our investigation into this important physiological pump will lead to increased understanding of parasite physiology and potentially identify an important gene(s) for a future drug target(s).

Predicting Horse Racing Outcomes Using Multinomial Logit and Probit Modeling Techniques

Jordan Eckert, CURO Research Assistant
Dr. Lynne Seymour, Statistics, Franklin College of Arts and Sciences

Can statistics beat random guessing in figuring out if a horse will win, place, or show for a race? The aim is to compare multinomial logit and probit models against random guessing, and themselves, to see if they are more accurate in predicting a horse's finish. The first step is to create the data set that will be tested by logistic regression. After research, the task begins of writing R-code to run the analysis. Ultimately, the goal is to create R-Code that could be used subsequently with other horse racing data from other years, a kind of plug and chug code. After both modeling codes have produced their outputs, a comparison of both against random guessing will be performed to see how accurate they are at producing the winning

horse. These methods will then be compared against themselves, and the most accurate model will be assessed. This accuracy will be gauged using each model's RSME. The anticipation here is that probit modeling will be better than logit regression modeling in predicting horse racing outcomes, but that both will be better than random guessing. Predicting horse racing has several other world applications. Horse racing markets follow a similar trend to time series markets such as the stock market, and are often theorized to move in similar manners. If these modeling methods prove efficient and effective in horse racing, then further research into other time series fields that fit a similar profile could be done using these modeling techniques.

Identification of Therapeutics that Target Zika Virus RNA Polymerase

Baker Edrees
Dr. Cory Momany, Pharmaceutical and Biomedical Sciences, College of Pharmacy

One aim of this experiment is to clone and purify the RNA Polymerase from the Zika virus. A second aim is to create an in situ method of making nucleoside triphosphates using human nucleotide metabolizing enzymes, like adenosine and uridine nucleoside kinases, for use in assays. The amino acid sequences of the proteins will be codon optimized to clone and purify the proteins in *E. coli*. The process of cloning involves using type IIS restriction enzymes simultaneously with ligation which allows for rapid cloning. The protein purification process entails using metal chelate chromatography. The goal of this project is to identify small molecules that inhibit the Zika virus RNA polymerase. This information will help with the fight against the Zika virus.

Disordered Drinking in College Populations: An Identity Issue?

Emily Edwards, CURO Research Assistant
Dr. Dawn T Robinson, Sociology, Franklin College of Arts and Sciences

It has been known for quite some time that Greek lettered membership is associated with greater alcohol usage in contrast to unaffiliated students. Traditional theoretical arguments emphasize peer affiliation and social learning to explain the differences in alcohol usage between affiliated and unaffiliated populations; however, comparable disordered drinking occurs beyond Greek populations. This project investigates whether the same processes explain problem drinking among fraternities and sorority members and non-members. We propose that a partier identity rather than fraternity or sorority involvement alone motivates disordered drinking. Affiliates and non-affiliates could share symbolic identity meanings associated with "partier"—one who participates in party culture. Both student populations, affiliated and unaffiliated, receive environmental signals to drink as encouraged from party symbols, such as drunken behaviors, friends drinking, underage drinking, etc., that cause an individual to enact the "partier" identity. This potentially dangerous identity manifestation is incorporated into the student's network; therefore, the individual prioritizes partying behaviors in order to maintain his social relationships or risk the loss of his network. We hypothesize that having more numerous and stronger social ties connected to the partier identity and consistent identification with meanings associated with the partier identity (e.g. self-descriptions of "fun", "social", "outgoing", and "irresponsible") will increase the level of disordered drinking, regardless of affiliation. To test this hypothesis, we surveyed a sample of 200, which consisted of affiliated and unaffiliated, male and female college students locally. After controlling for gender and race (male and white), students who participate in a fraternity have higher levels of disordered drinking as previous literature would predict.

Nitrogen Fixation of Biological Soil Crusts in Longleaf Pine Savannas Respond to Alterations in Precipitation Frequency

Sumaya El-Khalidi, CURO Research Assistant
Dr. Nina Wurzburger, Ecology, Odum School of Ecology

Biological soil crusts (BSCs) fix atmospheric nitrogen (N_2) into biologically available forms, and may be important to ecosystem recovery in longleaf pine savannas. BSCs must be exposed to moisture to be metabolically active, so the frequency of precipitation may affect their ability to fix N_2. Future climate scenarios for the southeastern United States predict a change in precipitation variability and little is known how

BSCs will respond to this shift. For this research, we investigated how variable moisture frequencies could impact N fixation in the BSC communities common in longleaf pine ecosystems. We performed a laboratory experiment in which we treated field-collected BSCs with low, moderate, and high precipitation frequency over an eight-week period. Nitrogenase activity was tested before treatment, at four weeks, and at the end of the experiment. A Repeated-Measures ANOVA was used to test whether N-fixation differed among treatments. We found that when exposed to high moisture frequencies, nitrogenase activity was undetectable, indicating that BSCs had difficulty in performing N-fixation. However, when exposed to the lowest moisture frequency, BSCs fixed a substantial amount of atmospheric N_2. BSCs observed response to variable treatment frequency simulates the likely response BSCs will reflect when exposed to climatic shifts. Since N is necessary for ecosystem recovery, determining BSCs' response may be important in understanding the resiliency of longleaf pine savannas to climate change, and how conservation efforts can be modeled to manage these rare environments.

Regulation of Sialic Acid Polymerization

Joseph Elengickal, CURO Research Assistant
Dr. Hawkeye Pierce, Biochemistry and Molecular Biology, Franklin College of Arts and Sciences

Glycans are sugar molecules that are on the surface of cells. They are vital to cell functions such as cell signaling, immune responses, and protein folding. They have also been found to play a role in illnesses such as cancer, and biomarkers for cancer cells have originated from the study of these glycans. Nevertheless, unlike other vital biological molecules like DNA and protein, not much is known about how these glycans are produced or how they function. The purpose of this research project is to investigate a specific glycan, sialic acid. This sugar molecule is found in high concentrations in the brain and plays an important role in neural transmission. On cell surfaces, sialic acid monomers link together to form polymers, long chains of these sugar molecules. The process by which these chains are elongated is not well known and is the subject of this research. This project investigates how sialic acid's polymerization is regulated by glycosyltransferases by using high performance liquid chromatography. This process works by separating sialic acid and then detecting the sialic acid with a small molecule called DMB. The project also investigates how specific proteins influence the polymerization by setting up a tet inducible system, thus furthering the understanding of sialic acid regulation. This research could lead to a better understanding of glycan regulation during oncogenesis and may even lead to future treatments for cancer.

Has Gentrification Led to Increased Police Brutality in the United States?

Emmanuel Elsar Jr.
Dr. Jennifer Joelle White, International Affairs, School of Public and International Affairs

With the increased coverage of relations between the police and minorities in the United States, one key factor has been continuously ignored. With rent prices and cost of living in major metropolitan cities rising, citizens who before were able to afford living in their homes are now being forced to relocate to cheaper areas. This process of removing and renovating a neighborhood so that eventually more middle class individuals move there is known as gentrification; however, the social and political implications usually involve wealthier, whiter people moving into low-income, minority heavy areas. One notable aspect of the combination of rising rent and a changing demographic is the increase of calls to police departments. One may come to the conclusion that this is the result of new people in the neighborhood and their preconceived notions of longtime residents in the area; others may argue it is a result of different viewpoints on how to conduct oneself in your neighborhood. Nevertheless, there is a different dynamic of how the police interact with their respective communities and in some cases it has led to the deaths of primarily black and latino men. In order to fully answer my proposed question, I plan to collect data from calls sent to police departments in the 10 largest metropolitan areas in the United States listing disturbances in the area and cross reference them to instances of police altercations with individuals in those cities.

Genetic Mapping of the Chromosome Variant K10-L2 in Maize

Brianna Renee English, Foundation Fellow, CURO Research Assistant
Dr. Kelly Dawe, Genetics, Franklin College of Arts and Sciences

Meiosis is a process in which a diploid cell divides into four haploid daughter cells, capable of becoming the organism's next generation. During the stage of anaphase, sister chromatids are pulled apart towards opposite spindle poles through microtubule attachment to the centromeres of the chromosomes. In maize, there are two forms of chromosome ten: a common normal version and a rare abnormal version which contains repetitive sequences called knobs. Knobs are normally inactive regions of the genome, but in the presence of the abnormal chromosome K10L2 they can act as neocentromeres. When active, these neocentromeres move towards the spindle poles ahead of the centromere during anaphase. This study is focused on constructing a genetic map of K10L2 and developing a better understanding of how neocentromeres function. Using fluorescent in situ hybridization to observe knobs, PCR to amplify candidate genes, and the observation of phenotypes unique to chromosome ten, we analyzed the combinations of markers from each test to generate a genetic map. This study will ultimately provide more information about the origins of K10L2 and will help in finding the location of the candidate gene.

Effects of Asphalt Mix Characteristics on Dynamic Modulus and Fatigue Performance

Austin Etheridge, CURO Research Assistant
Dr. S. Sonny Kim, Environmental, Civil, Agricultural, and Mechanical Engineering, College of Engineering

Developed under NCHRP 1-37A, the Mechanistic-Empirical Pavement Design Guide (MEPDG) provides three hierarchical levels of design inputs (i.e., levels 1, 2, and 3). This allows the designer to select the level of details of design inputs according to the level of importance of the project. The dynamic modulus |E*| is considered one of the fundamental asphalt mix properties and is obtained from a series of complex modulus tests at different temperature and loading frequency conditions. Several State Highway Agencies (SHAs) have already created or are in the process of creating an |E*| database for the calibration and implementation of MEPDG. Georgia Department of Transportation (GDOT) has made a continued commitment to the performance enhancement of pavement and proactively calibrated and implemented the MEPDG methodology for the design of flexible pavement structures. However, the GDOT material input library includes |E*| based on only two sources of aggregate. Further, an |E*| library for Polymer Modified Asphalt (PMA) and Ground Tire Rubber (GTR) Asphalt mixtures has not been developed yet although the PMA mixtures are being used for high volume traffic roads in Georgia. The study will supplement the current |E*| database by extending the aggregate sources for different Superpave mixes and binder types. Secondly, three different laboratory fatigue tests will be performed on selected mixtures. Based on different fatigue test approaches, a local fatigue prediction model will be recommended for Georgia pavement. Finally, the effects on dynamic modulus and fatigue due to different asphalt mixtures will be determined.

In Vivo and In Vitro Activity Analysis of Acetylation on Fructose-1, 6-Bisphosphatase in *Salmonella enterica*

Akiel Gabriel Etienne, CURO Research Assistant
Dr. Jorge Escalante-Semerena, Microbiology, Franklin College of Arts and Sciences

Glucose is an important building block for cells of all domains of life. Not surprisingly, cells have evolved elaborate systems to acquire glucose from their environments. Because of the relevance of glucose to cell function, cells can also make glucose endogenously. The pathway dedicated to this purpose is known as gluconeogenesis (GNG). The enzyme fructose-1, 6-bisphosphatase (Fbp) plays a key role in GNG because Fbp generates glucose 1,6-biphosphate. Fbp function is regulated at many levels. Recently, we discovered that Fbp function may also be regulated by post-translational modifications. Reverse Lysine Acetylation (RLA) is a post-translational modification that is conserved across all domains of life, and is used to modulate protein function. Recently, we showed that STM1857 acetylates

Fbp. It is not known how many times STM1857 acetylates Fbp, or how Fbp function is affected by acetylation. We hypothesize that acetylation may lower the activity of the enzyme relative to the non-acetylated version of it. To test this possibility, Fbp activity will be assessed in vitro as a function of its acetylation state. To do this we will use a continuous assay that monitors the oxidation of NADH at 340 nm. We will also use high-resolution mass spectrometry to determine which lysyl residues of Fbp are acetylated by STM1857. Acetylation sites identified by mass spectrometry will be validated by site-directed mutagenesis. Finally, the effect of acetylation on Fbp activity will also be assessed in vivo under conditions that require the cell to use GNG to make glucose.

The Association between Body Image Dissatisfaction and Sports Participation in Mexican-American Youth

Rhiannon Euhus
Dr. Jennifer L Gay, Health Promotion and Behavior, College of Public Health

Youth sports participation has well-known physical health benefits. However, its mental health effects are less known, particularly for Mexican-American youth. The purpose of this research was to analyze sports participation and body image dissatisfaction (BID) among Mexican-American adolescents to: (1) determine sources of pressure that contribute to BID in sports participation (2) compare the prevalence of BID in students involved in non-aesthetic, aesthetic and no sports, (3) determine if general physical activity has the same effect on BID as organized sports involvement, and (4) determine the association between sports-related BID and unhealthy eating behaviors. The sample (n=826) is from a 2010-2011 survey of Mexican-American students in south Texas. Eighty percent of the students reported participating in organized sports. Twenty-one percent of the athletes felt pressure to "look a certain way", with 57% saying the pressure came from friends. Compared with those who did not play sports, non-aesthetic sport athletes were the only group that had a significant difference in BID, with those athletes thinking they were smaller than their ideal body image ($p=0.0117$). BMI percentile, sports participation, physical activity, and sex were significant predictors of BID ($p<0.05$ for all associations). Physical activity behavior was found to have similar effects on BID as organized sports involvement. BID was not associated with unhealthy eating behaviors. These findings provide a better understanding of BID among Mexican-American youth; the results may inform parents and coaches how to identify youth who are most at risk, and aid in the creation of programs that mitigate BID.

Development of Biodegradable and Biosourced Microcellular Polyurethane Foams for Foam-In-Bag Packaging

Caria Evans, CURO Research Assistant
Dr. Jason Locklin, Chemistry, Franklin College of Arts and Sciences

High volume packaging applications for high value products often use polyurethane foam-in-bag systems to save packaging time, labor costs, and packaging facility footprint space. Despite ubiquitous use, packaging compositions that are fully biodegradable or compostable have not been fully accepted by the packaging industry. The two components of foam-in-bag polyurethanes are typically a multifunctional isocyanate precursor formulation and a polyol precursor formulation which polymerize into closed- or open-cell foams upon mixing via step growth polymerization and CO_2 bubble formation. The project will focus on the development and characterization of the isocyanate and polyol precursors, surfactants, additives, and rheological modifiers from renewable sources that meet the appropriate reaction conditions to generate stable closed-cell and open-cell polyurethane foams. Developing recipes that have high biosourced material content, high impact resistance, proper viscoelastic properties, and fully compostable chemistries is principally important. Free standing monoliths of polyurethane foams will be prepared using a counter rotating mixer. The degree of functionality of the polyol and isocyanates, catalyst loading and type, viscosity modifiers, surfactants, and fillers of the formulations will be systematically varied to determine optimal cream and rise times and thermomechanical properties. Dynamic mechanical analysis and rheological measurements will be used to probe foam kinetics and tune material moduli (1 kPa – 1 MPa) over shipping temperature ranges, approximately -30

°C – 70 °C. Foam uniformity will be assessed by optical and electron microscopy.

Green Greenhouses: An Application of Energy Informatics

Nadine Fares, CURO Research Assistant
Dr. Richard Thomas Watson, Management Information Systems, Terry College of Business

In order to feed a growing and wealthier population within the next 30 years, food production must increase by an estimated 70 percent. Controlled-environment agriculture (CEA), such as indoor farms and greenhouses, is a key path to increasing food production; however, the industry's current practices can require considerable energy to power artificial lighting to maintain plant growth on overcast days to meet production schedules. This system is inefficient, resulting in energy waste and higher operational costs. Phytosynthetix has developed controllable LED lighting, in conjunction with the University of Georgia's Horticultural Physiology Laboratory, which uses a built-in light intensity sensor to set the level of artificial light to maintain plant growth when natural lighting falls below a plant's threshold needs. We are working with Phytosynthetix to build a discrete event simulator to understand how to create an effective information system to minimize the cost of electricity for a CEA while meeting plant production schedules. Sensitivity analysis of this simulation model will help us to identify horticultural studies to gain a greater understanding of the critical determinants of plant growth. We also intend to use the model to refine methods for descriptive analytics (plant database), predictive analytics (energy price and solar radiation forecasting), and prescriptive analytics (portfolio management). By running simulations using R, we have estimated over 90% decrease in electricity costs by using the smarter model instead of traditional lighting. If implemented, this project could contribute monumentally to food security and sustainability, which are necessary for our developing world.

Effects of Microbe Activators in an Organic Agricultural System

Brendan Fatzinger, CURO Research Assistant
Dr. Elizabeth Little, Plant Pathology, College of Agricultural and Environmental Sciences

In organic agriculture, maintaining plant health depends on soil microbial biodiversity. Soil microbes are important for nutrient cycling, pathogen suppression, and soil quality. The primary means of maintaining soil microbial populations is the periodic application of composted plant and animal wastes. In addition, commercial preparations are available which claim to enhance the activity of beneficial microbes. This study will assess the effectiveness of specific homeopathic preparations on soil microbiological activity and plant health. The project will be conducted at the UGArden on the UGA campus. The experiment consists of two different rotations, either cool season vegetables with a summer cover crop or warm season vegetables with a winter cover crop. All crops will be grown using organic methods either with or without the additional preparations. Basal soil respiration CO2 output from each experimental replication will be measured using alkali traps and titration. Populations of free-living and parasitic nematodes will be counted and specific microbial communities will be identified using gene amplification. Plant health will be quantified based on the severity of selected diseases and on growth parameters such as harvest weight and quality. Base line measures of soil microbial activity will be determined at the beginning of the experiment and repeated at the end of each cropping season. The long term goal is to identify practices that increase productivity and sustainability in organic agriculture.

Techno-Economic Assessment of Anaerobic Digestion Technology to Produce bioCNG

Carter Fitzgerald, CURO Research Assistant
Dr. Sudhagar Mani, Chemical, Materials, and Biomedical Engineering, College of Engineering

Animal manures, food waste and lignocellulosic biomass can be anaerobically digested into biogas, a mixture of carbon dioxide and methane. Anaerobic digestion is the series of biological processes where organic material is broken down by microorganisms, particularly methanogenic bacteria, in the absence of oxygen. The biogas can

be cleaned and compressed to produce compressed natural gas (CNG), or compressed even further to form liquid natural gas or burned to produce heat and power. The digested organic material can be used as compost or as fertilizer. The main objectives of this study were to develop a process simulation model to convert organic materials into bioCNG via anaerobic digestion technology and to evaluate the economic feasibility of producing bioCNG. An anaerobic digester plant capacity of 100 tons/day was simulated to produce biogas using a Superpro designer software platform. The biogas was cleaned and compressed to produce bioCNG. A detailed mass and energy balance was conducted and used for estimating the economic analysis. Finally, the capital expenditure, operating cost and the minimum selling price of bioCNG were calculated and compared with market price. A detailed sensitivity analysis was conducted to evaluate the impacts of process and plant parameters to minimize the energy cost of CNG. The developed model can be used for conducting the economic feasibility of small to medium scale biogas plants in the US.

Take Me Out to the Ballgame: A Legal Examination of Spectator Injury Risk at Major League Baseball Games

Zack Flagel, CURO Research Assistant
Prof. Nathaniel Grow, Insurance, Legal Studies, and Real Estate, Terry College of Business

Each year, over 1,750 fans attending Major League Baseball (MLB) games are severely injured by foul balls, a worrisome statistic that has increased each year. Despite this alarming trend, MLB does not currently have a standardized policy that requires ballparks to have nets protecting fans from foul balls flying into the stands. As such, fans sitting in the Danger Zone, areas of the ballpark that have increased in danger over time, often do not have such protection and are at risk to injury. Legally, however, MLB has no motivation to make any change due to a protection in the American legal system known as the "Baseball Rule," which essentially assigns full liability of any injury to the spectator (and zero responsibility of liability to MLB) due to the inherent risk of attending a game. The only exception to this rule is if the injury occurs in the "most dangerous part of the ballpark," historically considered only to be the area behind home plate, which already has protective netting in every MLB ballpark. Presenting original research on several quantitative factors that have increased the degree of spectator risk in the Danger Zone over time, this paper argues that the "most dangerous part of the ballpark" has expanded, and consequently should be reflected in decisions by American courts. However, until courts change their position on the "Baseball Rule," MLB is unlikely to change their policy on protective netting anytime soon, and the risk of injury by a foul ball will remain.

Volumetric Muscle Injury on Mitochondrial Function

Alexandra Bronwen Flemington, CURO Research Assistant
Dr. Jarrod A Call, Kinesiology, College of Education

Volumetric muscle injuries sustained during combat cost the Department of Defense a total of $42.4 billion a year. Currently, the specific pathophysiology of such an injury is unknown. This lack of knowledge leads to inadequate rehabilitation and recovery for patients. The primary objective of this study is to determine how the mitochondria of these injured cells are affected. We hypothesize that by determining the mitochondrial enzyme activity, specifically citrate synthase, in the muscle during the first couple of weeks post-injury, we will gain a better understanding of what occurs physiologically following such an injury. To determine mitochondrial enzyme function, we will perform a citrate synthase assay on the muscle samples. We first homogenize each sample in phosphate buffer and then freeze-thaw each one three times. We then dilute each sample and add an oxaloacetate solution in order to start the enzymatic reaction. We will then put the sample along with the oxaloacetate solution in a spectrophotometer while the reaction is occurring. The spectrophotometer will take readings at 412 nm every 15 seconds for 3 minutes. These readings are then used to determine the activity of the citrate synthase enzyme in the mitochondria of the injured muscle. Overall, we hope to clarify how the injury affects mitochondrial function, thus indirectly studying the effect on the rate of muscle recovery. We hope to apply this new knowledge to the creation of innovative and effective

rehabilitation programs for victims of volumetric muscle injuries.

Biophysical Properties of Pectins Isolated from Seed Mucilage of *Arabidopsis thaliana* Wild-type and gaut11-2 Mutant Plants

Haley Folmar, CURO Research Assistant
Dr. Debra Mohnen, Biochemistry and Molecular Biology, Franklin College of Arts and Sciences

Pectin is a complex polysaccharide used extensively in the food and nutraceutical industries. Analysis of the biophysical properties of pectin from wild type and mutant plants will provide information on molecular targets in pectin structure that can be modified to enhance its properties for industrial materials applications such as food packaging. To test this, we are studying *Arabidopsis* seed mucilage, a source of pectin-rich fibers. Our earlier studies showed that mucilage from the *Arabidopsis* Galacturonosyltransferase (GAUT) 11 mutant (gaut11) is more easily released from seeds compared to mucilage from wild type (WT) seeds. We hypothesize that the lack of a functional GAUT11 pectin biosynthetic protein in the gaut11 mucilage leads to structural changes in pectin that result in changes in mucilage release compared to WT. To study the relationship between the physical properties and structure of pectin in wild type versus gaut11 mucilage, we isolated pectin from mucilage of both types of seeds. We fractionated the isolated mucilage over a diethylaminoethyl (DEAE) cellulose column with the goal of comparing the physical and structural properties of the different pectic components in the WT and mutant mucilage. Both types of fractionated mucilage will be analyzed for adhesion, thin film generation, and nanofiber formation properties in collaboration with Dr. Sergiy Minko's laboratory. We hypothesize that pectin from gaut11 may not exhibit the same adhesive properties as pectin from the WT. The significance of the results in regards to functional properties of pectin that may have applications in the materials area will be discussed.

Dialect Variation in the American South

Shawn Christian Foster, CURO Research Assistant
Dr. Peggy Renwick, Romance Languages, Franklin College of Arts and Sciences

There is not just one Southern accent. People from different states, social classes, and centuries may all sound Southern despite their speech having few features in common. Understanding the differences between the many accents of the South is a vital step towards understanding the peoples of the region. This project uses data from the Digital Atlas of Southern Speech to investigate how vowel pronunciation varies among populations of the American South. The vowel features to be examined will include the "Southern Shift," whose features are often perceived as the "Southern Drawl," and the pin-pen merger, a sound change in which the distinction between words like pin and pen, and tin and ten is lost. Phonetic analysis will be carried out on over 16,000 acoustic measurements. Then, tests will be run to compare measurements across demographic lines. Significant differences are expected to be found in participation in both of these sound shifts based on the race, gender, and age of the speaker. It may be possible to determine the chronological or social origins of these changes by examining differences in pronunciation across groups in the sample. Examination of how these sound changes spread throughout the region may reflect how the different speech communities of the South interact with and influence each other. The ultimate goal of this investigation is to determine which dialect features, if any, are common throughout the South, and which features serve to differentiate linguistic communities within the region.

A Novel Porcine Model of Vascular Cognitive Impairment Demonstrates Changes in Cerebral Blood Flow and White Matter Tracts

Lily Francis, CURO Research Assistant
Dr. Franklin Delano West, Animal and Dairy Science, College of Agricultural and Environmental Sciences

Recent studies anticipate the prevalence of dementia will increase by three hundred percent in the next three decades. Almost all aging adults develop cerebral white matter damage that is

linked to poor blood supply, which progresses and leads to symptoms ranging from mild cognitive dysfunction to severe vascular dementia. Although there is no preventative treatment for dementia, preliminary results of remote ischemic conditioning (RIC) show promise of decreasing white matter damage by increasing cerebral blood flow. Most animal models of dementia use rodents, which are inadequate due to the extreme cerebral differences between humans and rodent species. For this reason, it is necessary a model more similar to the human brain is developed to test RIC treatment for vascular cognitive impairment (VCI). The aim of this study was to develop a chronic hypoperfusion porcine model to more adequately mimic dementia in humans. In order to decrease cerebral blood flow and induce corresponding white matter lesions, bilateral vascular constrictors were placed on the common carotid arteries (CCA). The efficacy of these constrictors and the resulting hypoperfusion model were studied using magnetic resonance imaging (MRI), diffusion tensor imaging (DTI), magnetic resonance angiogram (MRA), and arterial spin labeling (ASL) sequences pre-VCI induction and 4 weeks post-VCI induction. These sequences revealed thar gradual bilateral constriction of the CCAs resulted in a global decrease in cerebral blood flow and compromised white matter integrity. These findings suggest that bilateral vascular constriction of the CCAs produce a reproducible potential porcine model of VCI.

University of Georgia Amending and Roll Call Project

Ryan Freeman, CURO Summer Fellow
Dr. Michael S Lynch, Political Science, School of Public and International Affairs

As measured by roll call voting behavior, congressional polarization is up to the highest levels since the Civil War. As a result, congressional approval ratings are extremely low. While interest groups on both sides of the aisle have begun to research methods to fix the problem, there is comparably little scholarly research into Congressional institutions in recent decades. Moreover, the little work that exists focuses on existing data from roll call voting patterns of members. Oftentimes, these votes are taken out of context and no additional details regarding lawmaking are provided. My research proposal seeks to fill in some of these gaps. I have been working with the University of Georgia Amending and Roll Call project. This is the first systematic effort to model the roll call generating process. Professors Madonna and Lynch have headed the project to code data on all amendments to landmark enactments. It has shown a sharp increase in votes on "messaging" amendments. These are amendments offered solely for the purpose of putting partisan opponents on record, with little policy success. This may serve to artificially increase polarization. The information being looked at comes from *The Congressional Record*. We record data on the type of amendment, the party of the politician offering the amendment, the type of vote that was taken, the number of yeas and nays (if applicable), and whether or not the amendment passed or failed among other things.

White Matter Integrity Decreases Similarly with Age between People with Schizophrenia and Healthy Individuals with Low Cognitive Control

Emily Elizabeth Gale, CURO Research Assistant
Dr. Jennifer McDowell, Psychology, Franklin College of Arts and Sciences

Schizophrenia is a complex psychiatric disorder that may be indicated by positive symptoms, including delusions, disordered speech, and impaired cognitive control. Recent studies suggest that these cognitive deficits may be related to alterations of neural white matter. In the superior longitudinal fasciculus (SLF), a white matter tract that has been linked with cognitive control, white matter integrity (WMI) is decreased for people with schizophrenia relative to healthy people with high cognitive ability. Both WMI and cognitive control are known to decrease with age in healthy people, but little is known about how aging changes these in people with schizophrenia. This study sought to identify whether neural WMI is affected similarly by age in individuals with schizophrenia and healthy people with comparable cognitive function. Diffusion-weighted imaging was used to assess WMI in 26 participants with schizophrenia and 26 healthy participants with low cognitive control, who were further subdivided into younger (19 to 35) and older (44 to 63)

groups. Regions of interest were drawn on individual brain images to isolate left and right SLF. Measurements of fractional anisotropy (FA, an index of WMI) were then obtained and compared between groups. This analysis demonstrated no significant interaction between diagnosis and age. These results suggest that regardless of diagnosis, decreases occur in older individuals, and regardless of age, decreases occur in individuals with schizophrenia. Both diagnostic groups seem to age similarly, which suggests that decreases in schizophrenia are likely disease-specific rather than related to cognitive control ability.

Effects of Acid Rain on *Brassica rapa*

Luke Gamblin, CURO Research Assistant
Dr. Ford Ballantyne, Ecology, Odum School of Ecology

Acid rain is characterized as precipitation which has pH values that are lower than those of normal rain (<5.5). This increased hydrogen ion concentration is typically caused from the diffusion of industrial waste into the atmosphere. This research project is aimed at further understanding the effects of acid rain on plant life history through the manipulation of *Brassica rapa* (mustard plant) by using varying acidities of "rain" water. The experiment will consist of 4 experimental groups of *Brassica* which will each be watered solely with its corresponding "acid rain" solution. The solutions have pH values of 2.5, 3.5, 4.5, and 5.5, with the 5.5 solution being the control for naturally occurring rain. Every plant in the experiment will be watered with the same amount of corresponding solution (as needed), and each plant will be measured every other day for 45 days. Measurements will include stem height, leaf count and length (from stem), flowering time (# of days to first flower appearance), and number of seeds produced. Additionally, a general assessment of each plant's health will be made throughout the experiment. In general, it is expected that those plants which are watered with low pH "acid rain" will grow slower, be less healthy, and produce fewer seeds. These findings will be important because they will provide data for the probable detrimental effects of acid rain on plant life history, which could be broadly extrapolated to agricultural practices in those areas which are subject to acid rain.

Fighting a Pathogen with Its Own Medicine: Enzymatic Preparation of Carbohydrates for Effective Immune Response

Nikhil Reddy Gangasani, CURO Honors Scholar, CURO Research Assistantship
Dr. Fikri Avci, Biochemistry and Molecular Biology, Franklin College of Arts and Sciences

Pneumococcal diseases like pneumonia are currently a major global health issue. Caused by *Streptococcus pneumoniae* bacteria, these diseases are responsible for up to 1.6 million annual deaths globally, according to a World Health Organization estimate. In particular, *S. pneumoniae* serotype III (*Pn3*) has increasingly victimized children under the age of five, who represent about half of global victims. The worldwide proliferation of microbial resistance to antibiotics accentuates the need for more effective pneumococcal vaccines. Glycoconjugate vaccines, composed of carbohydrates linked to carrier proteins, alleviate this issue. The *Pn3* bacterium expresses a carbohydrate coating on its microbial surface called a capsular polysaccharide (CPS). Breaking down this long, complex *Pn3* CPS into smaller fragments of suitable size and composition provides an appropriate carbohydrate source for studying how glycoconjugate vaccines activate a protective immune response against *Pn3* CPS. In 1931, a bacterium called *Bacillus circulans* was observed to generate an enzyme which degrades *Pn3* CPS into smaller fragments. Through experimentation, we purified the *B. circulans* enzyme and determined its size, studied the interactions between the enzyme and *Pn3* CPS, and determined the means of CPS degradation. Furthermore, we established ideal conditions for the enzymatic degradation of *Pn3* CPS, and confirmed the sizes of the main degradation products. Utilizing what is now known about *Pn3* CPS and the *B. circulans* enzyme that degrades it, future research efforts will work towards creating a means of effective protection from the harmful *Pn3* bacterial pathogen.

Fake News: The New Propaganda Machine

Jessica Garcia, CURO Research Assistant
Dr. Audrey Haynes, Political Science, School of Public and International Affairs

Throughout history, those fighting in the political trenches have found methods to manipulate the public to behave in ways to benefit the propagandist rather than the public. Often this manipulation has been through the use of campaign ads, jingles, and whisper campaigns. In 2016, the emergence of the widespread use of "fake news" created concern among those who study American politics. While "fake news" is not new, the significant increase and the political nature of this recent manifestation is concerning. There has been little systematic analysis of the "fake news" that has made its way into the political dialogue. While we know the dispersion of "fake news" surpassed mainstream, vetted news on social media platforms such as Facebook and Twitter, we have little understanding of what "fake news" usage really looked like. What were the sources, targets, and messages conveyed by this "fake news?" By exploring this data systematically, we can make better assessments and projections about the likely impact of this "fake news." We conduct this exploration by analyzing politically-related fake news stories generated during the 2016 campaigns and during the two months after the presidential inauguration. We have gathered information on "fake news" from this period through archived "fake news" on the Snopes.com website, and we have supplemented this data with additions gathered through our own searches. We use this data to explore patterns found throughout the "fake news" universe and discuss the implications of these patterns on the future of American political campaigns and policy-making.

Overexpression and Characterization of Two Pectate Lyases from *Paenibacillus amylolyticus*

Rebecca Marie Gardner, CURO Research Assistant
Dr. Joy Doran Peterson, Microbiology, Franklin College of Arts and Sciences

Cellulosic ethanol is an alternative fuel which has the potential to be cheaper than corn-based ethanol and cleaner than petroleum. However, further improvement in ethanol yields and reduction in cost is necessary for cellulosic ethanol to become a renewable fuel on a global scale. Many agricultural wastes used in cellulosic ethanol like citrus peels and sugar beet pulp are rich in pectin, a plant polysaccharide in the cell wall that provides structure. Pectinases such as pectate lyases degrade pectin and are conducive to higher ethanol yields for these pectin-rich biomasses. Besides cellulosic ethanol, pectinases are useful for other industries like textile manufacturing and food processing. Despite this, pectinases lack the research that other enzymes have received. *Tipula abdominalis* larvae can degrade cellulosic biomass due to bacteria in its hindgut. One bacterium which does this is *P. amylolyticus*. Two pectinases found in *P. amylolyticus*, PelA and PelB have previously been characterized and demonstrate activity on a broad range of pectin, singlehandedly doing the work of multiple pectinases. In fact, PelB has been used successfully to ferment cull peaches. An analysis of the genomic sequence of *P. amylolyticus* identified two additional pectate lyases. These two lyases, pamy_1763 and pamy_4669, will first be heterologously expressed in *Escherichia coli* KRX. Pectate lyase assays will then be used to identify optimum temperature, pH, etc. It is likely that the lyases will require calcium ions, prefer an alkaline pH, and have a broad substrate range similar to the two previously characterized pectate lyases in this system.

Determining Fidelity of the Physical Activity and Learning (PAL) Program

Catriona Geddes, CURO Honors Scholar, CURO Research Assistant
Dr. Jennifer L Gay, Health Promotion and Behavior, College of Public Health

Evidence suggests that being physically active can increase academic achievement, and that encourage giving children access to environments that allow them to play, run around, and interact socially with their peers. The Physical Activity & Learning (PAL) Program looks directly at the effect that physical activity can have on mathematic and reading skills in elementary school students. Each year, sixty 2nd-5th grade students from two elementary schools participate in PAL. Students are selected based on academic, behavioral, and social characteristics. One area that can impact PAL effectiveness is implementation, or how closely teachers follow the lesson plans, student engagement, attendance, and participant satisfaction with PAL. Preliminary analyses were conducted to examine fidelity in PAL. Choral reading is the most frequently used

teaching strategy, followed by partner reading. Addition was the most covered skill in math. Separate one-way ANOVA models tested differences in fidelity for teaching, student learning, and engagement by subject matter. Fidelity scores for teaching, student learning, and engagement were high relative to the maximum possible score. There were no significant differences in fidelity across PAG, reading, and math ($p>0.05$). This means that teachers follow the objectives of the program similarly across subjects. Future analysis will include the full implementation score, incorporating attendance and participant satisfaction. Associations between implementation and achievement in math and reading will be examined. Programs like PAL have the potential to improve academic achievement for children. Tracking program implementation is important to understand the relationship between PAL and academic learning.

Characterization of Causative Mutations in OGT for XLID

Stephan Nicholas George, CURO Honors Scholar, CURO Research Assistant
Dr. Lance Wells, Biochemistry and Molecular Biology, Franklin College of Arts and Sciences

Approximately 1% of the global population is affected with intellectual deficiency, with males affected more than females. Approximately 5-10% of male non-syndromic cases have been attributed to abnormalities in the X chromosome. Recently, 7 missense mutations (L254F, A259T, R284P, A319T, E339G, T570A, Y835C) in the X-linked O-GlcNAc transferase (OGT) gene have been designated causative for the disorder. OGT catalyzes the reversible transfer of the glycan N-acetylglucosamine (GlcNAc) from UDP-GlcNAc to serine and threonine residues on its nuclearcytoplasmic and mitochondrial substrates, while the enzyme O-GlcNAcase (OGA) reverses this process. UDP-GlcNAc is a byproduct of the hexosamine biosynthesis pathway, of which approximately 5% of cellular glucose levels is directed. Thus, O-GlcNAc cycling by OGT and OGA affects cellular functions such as transcription, translation, cell cycle regulation, and proteostasis in a nutrient dependent manner. Consequently, abnormalities in O-GlcNAc cycling have been linked to diabetes, XLID, cancer, and Alzheimer's disease. The goal of this project is to determine how each OGT mutation impacts cellular function to arise in the disorder's phenotype. To accomplish this, the OGT variants will be biochemically examined with respect to stability/activity/kinetics by defining the altered interactome of the OGT mutants using common quantitative glycoproteomic approaches. Preliminary data suggests that altered cleavage of host cell factor C-1, a cell cycle regulator in neurons, is caused by OGT mutation. Additionally, a UDP-Glo assay found that other mutants displayed reduced glycosylation of CK2 peptide. Combined, the initial data suggest these mutations may cause XLID by impairing the catalytic and proteolytic activity of OGT.

Creation of Genetically Modified Pomgnt2-Knockout Neuro2A and C2C12 Mouse Cell Lines by CRISPR/Cas9 Gene Targeting to Further Understand Dystroglycanopathies

Umar Muhammad Ghilzai
Dr. Aaron Beedle, Pharmaceutical and Biomedical Sciences, College of Pharmacy

Pomgnt2 is a protein that plays a vital role in the glycosylation of α-DG, which is a protein found on the cellular membrane of many cells as a component of the dystrophin glycoprotein complex (DGC). α-DG has the important role (among others) of cell to matrix signaling through the binding of extracellular proteins. A specific type of secondary dystroglycanopathy can arise due to mutations within the Pomgnt2 gene that results in the hypoglycosylation and reduced binding capabilities of α-DG. To expand research into the study of secondary dystroglycanopathies, we developed Pomgnt2-knockout neuroblastoma and myoblast mouse cell lines that will allow us to extrapolate information about the inner workings of muscular dystrophy through laboratory testing. To minimize the possibility of off-target modification of the cell lines, we have used the "nickase" Cas9 strategy with specific gRNAs. We expanded many single clonal lines for both cell types and identified Pomngt2-knockouts by Western blot analysis of α-DG glycosylation. These new Pomgnt2-knockout cell lines can now be used to understand the role of Pomgnt2-deficiency in α-DG glycosylation and functional roles for α-DG in cellular biology.

Abstracts

Analysis of Discrimination Methods for Amplifying the Microbiome from Plants

Cecelia Giangacomo, CURO Research Assistant
Dr. Jason Wallace, Crop and Soil Sciences, College of Agricultural and Environmental Sciences

In order to analyze the DNA of the microbiome from plant samples, it first must be amplified through PCR. Conserved priming sequences and small starting percentages of microbial DNA create a situation in which it is difficult to exclude plastid DNA without a large degree of bias. Many methods have been used to discriminate against host DNA, but there has been no comparison of the accuracy and cost efficiency of the different methods when used on plant tissue. We compared the ability of anti-chloroplast primers, blocking primers and PNA clamps to discriminate against host DNA through amplification in PCR. Each discrimination method was tested on DNA samples from leaves, soil, and a known bacterial community under standardized conditions with appropriate positive and negative controls. The resulting libraries were sequenced, and the methods compared for their ability to accurately amplify target DNA while excluding host DNA.

Probing the Structural Basis of P-Glycoprotein Transport of μ-Opioid Receptor Agonists: Methadone and Loperamide

Morgan Gibbs, CURO Research Assistant
Dr. Arthur Roberts, Pharmaceutical and Biomedical Sciences, College of Pharmacy

P-glycoprotein (Pgp) protects the brain from toxins by acting as a gatekeeper at the blood-brain barrier. Pgp also limits penetration of therapeutics including μ-opioid receptor agonists into the brain for treatment of central nervous system (CNS) diseases. Although they are structurally similar, the μ-opioid receptor agonist loperamide is effluxed out of the CNS by Pgp at four times the rate of methadone. Because of these differences, methadone and loperamide were used to probe the mechanism of Pgp-mediated efflux. We hypothesize that higher Pgp-mediated efflux rates of loperamide are the result of multiple loperamide binding to Pgp. We found that loperamide was a more potent activator of Pgp-mediated ATP hydrolysis than methadone. Consistent with our hypothesis, loperamide-induced activation of ATP hydrolysis suggested at least two loperamide binding sites on Pgp, while methadone-induced activation suggested a single methadone binding site. NMR and fluorescence were used to develop a structural model for transport. Saturation transfer double difference NMR identified the functional groups involved in molecular recognition of Pgp and revealed that loperamide had more interactions with the transporter than methadone. Acrylamide quenching of Pgp fluorescence indicated that loperamide shifts Pgp into a conformation that promotes transport, while methadone shifts Pgp into an inhibitory conformation. This information combined with paramagnetic relaxation enhancement NMR experiments and computer modelling was used to pinpoint the binding locations of loperamide and methadone on Pgp. The drug-bound Pgp models suggest that multiple drug binding and conformational changes play a critical role in Pgp transport of this class of drugs.

Fecal Composition and Its Relation to Diet

Hannah R Gilbert, CURO Research Assistant
Dr. Laurie Reitsema, Anthropology, Franklin College of Arts and Sciences

Feces is an important substrate used in different analytical techniques with the purpose to see components of food that are digested, excreted, and how the body interacts and uses those different compounds for bodily processes; however, the actual micro-molecular composition of fecal samples and how exactly fecal composition is determined is still unknown to scientists. Through analysis of fecal samples from *Theropithecus gelada*, the gramnivorous gelada monkey, the very grass-rich and comparably low protein diet should result in a fecal sample that has little to no protein at all, but mostly carbohydrates like cellulose from the undigested stalks of grass. With a breast feeding infant, it is normal to find fatty acids in the feces from the mother's breast milk; but if there were proteins found in the fecal samples of weaned individuals, then the conclusion that feces are diet driven might have a different conclusion. Fluorescent protein assay and mass spectrometry carbohydrate analysis were used to analyse fifteen samples: six breastfeeding infants and their mothers, three behaviorally weaned individuals, four samples from one infant

across the longitudinally critical weaning period, and one sample that is from the youngest individual who has the highest carbon-nitrogen ratio of all. I hope to see how exactly how fecal composition correlates to the diet. The diet of the geladas is known and there is currently isotopic carbon-nitrogen ratio data from mass spectrometry to compare the data to.

Assessment of Oxidative Stress and Serum α-Tocopherol Levels in Exercising Horses in Response to Level and Form of Vitamin E Supplementation

Maddie Gloeggler
Dr. Kylee Duberstein, Animal and Dairy Science, College of Agricultural and Environmental Sciences

Vitamin E is an essential antioxidant found primarily in fresh forages and commercial equine feed rations as synthetic all-rac-α-Tocopherol acetate. This study aimed to compare natural to synthetic forms of vitamin E, and determine if supplementing above NRC recommendations is beneficial to exercising horses. Following a 14 day washout period, 18 horses were divided into three treatment groups and fed the control diet plus (1) synthetic low (SYN-L), 1000 IU synthetic α-Tocopherol acetate/d, or (2) synthetic high (SYN-H), 4000 IU/d synthetic α-Tocopherol acetate, or (3) natural (NAT), 4000 IU/d micellized RRR-α-Tocopherol. After a 7 day acclimation period, horses began a 6 week exercise protocol, with standard exercise tests (SET) performed prior to and at the conclusion of the 6 week exercise protocol. Resting, pre-feeding blood samples were collected at days 14, 21, 42 and 63, as well as 2 hour pre- and post-SETs. Initially and at pre-SET1, no differences in serum α-Tocopherol were seen across treatment groups. At all other time points, NAT horses had higher serum α-Tocopherol compared to SYN-H and SYN-L ($P<0.05$). No differences were noted between SYN-H and SYN-L. Pre SET1, NAT had lower protein carbonylation compared to SYN-L ($P=0.048$). Only NAT horses showed a significant increase in protein carbonylation post exercise for both SET1 and SET2 ($P=0.0004$). SYN-L and SYN-H horses showed a tendency ($P=0.066$) to increased protein carbonylation post SET2 only. Results indicate that natural vitamin E is superior to synthetic in maintaining serum α-Tocopherol levels in response to exercise and resulted in increased protein oxidation post exercise.

Goethe's Discovery of the Divine in Nature

Anna Magdalena Goebel
Dr. Martin Kagel, Germanic and Slavic Studies, Franklin College of Arts and Sciences

Johann Wolfgang von Goethe (1749-1832), a German writer and a natural philosopher, spent much of his life studying nature and attempting to understand the emotions it evoked in him by focusing on the human perception of nature. Through his literary works he strived to understand and explain the divine that was hidden in the complexity and depth of the natural world around him. Examining Goethe's novel, *Elective Affinities*, autobiography, *From my Life: Poetry and Truth*, and poem, "On the Divine," my paper argues that Goethe found the divine in the orderliness that nature possesses. He is able to make sense of the world around him using a God manifested in nature's structure rather than the traditional Christian God image. In the poem "On the Divine," nature isn't able to distinguish between the good and the evil, treating everything as equal. This impartial characteristic makes it predictable, running its natural course, unable to be stopped by anyone. In Goethe's novel *Elective Affinities*, nature's order is continually established through the application of natural sciences, equating human relationships with simple chemical reactions. In his autobiography *From my Life: Poetry and Truth*, Goethe allows us to trace his discovery of the "Erhabenen" (the sublime); the connection he makes between the divine and nature's impact on him. By offering his readers insight into the orderliness of nature, Goethe shows us that God is embodied in nature and that the divine is actually all around us. This belief ultimately let him make sense of the complex idea of God.

Limb Elevation as a Model for Peripheral Arterial Disease

Shaun Goh, CURO Research Assistant
Dr. Kevin McCully, Kinesiology, College of Education

Prior studies have shown that limb elevation can decrease blood flow to the elevated muscle, similar to reductions seen in peripheral arterial disease (PAD) patients. The purpose of this study was to test if limb elevation can be used as a model for PAD and to look at the effects of oxygen saturation on the endurance test developed by the lab. Experiments consisted of an endurance test with oxygen saturation monitoring, followed by reperfusion and mitochondrial capacity tests. The endurance index (EI) was measured using accelerometry and electrical twitch stimulation. Blood flow and mitochondria capacity were measured using the rate of recovery of oxygen consumption through near infrared spectroscopy (NIRS). The mean EI after 6 Hz between 2 cm and 60 cm was 79.5 $\pm$ 8.6% and 74.4 $\pm$ 18.3% ($p=0.09$). The end of exercise oxygen saturation showed no significant differences with levels of 52.9 $\pm$ 12.4% and 49.7 $\pm$ 42.7% for 2 cm and 60 cm ($p=0.42$). Oxygen delivery was slower during the elevated condition ($p=0.04$) with time to half magnitudes of 11.3 $\pm$ 3.3 seconds versus 23.4 $\pm$ 16.2 seconds for 2 cm and 60 cm. Mitochondria capacity across both elevations were similar with rate constants of 2.8 $\pm$ .4 at 2 cm and 2.9 $\pm$ .4 at 60 cm ($p=0.38$). Conclusively, limb elevation is a limited model for PAD from a functional standpoint, but is reflective of previous blood flow and mitochondria capacity measurements. It may also provide validation for the accelerometer endurance test based on its relationship to oxygen levels.

The Convergence of Quantum Physics and Religious Mysticism

Kalvis Golde, Foundation Fellow
Dr. David Williams, Religion, Franklin College of Arts and Sciences

Science and religion engage in vigorous debate over truth about the universe. Today, however, there is evidence that religion and science are converging to a similar truth, while claiming to progress in opposite directions. Quantum physicists and religious mystics both agree that interconnectedness is a basic truth of our universe; each also believes that the other's methods should fail to produce valid understanding of any sort. This research investigated questions addressed by both quantum physics and religion, including Hinduism, Buddhism, Judaism, and Islam, especially forms of mysticism. It determined that the convergence of these intellectual traditions is real and significant, not a superficial phenomenon. The research then compared fundamental assumptions of both groups to discern why their divergent methods have arrived at a similar picture of reality, in particular the idea of an interconnected universe. Two possible conclusions were drawn. The convergence of physics and religious mysticism may foreshadow a new understanding of the universe based firmly on interconnectedness. Alternatively, the assumptions of both physicists and mystics are so rife with implication for their respective searches for truth that this agreement may push one branch into a crisis and spark a revolution in thinking among its members.

Concrete Art and Fascism in Argentina in the 1940s

Nina Goodall
Dr. Nell Andrew, Art, Lamar Dodd School of Art, Franklin College of Arts and Sciences

In the summer of 1944, a magazine called *Arturo: Revista de Artes Abstractas* ran for a single issue in Buenos Aires, Argentina. Although short-lived, this magazine signaled the formation of a group of artists intent on exploring invention and abstraction in art and denouncing the traditional picture frame. The group was interested in the European style of abstraction that offered a new language through the abandonment of representation. After an exhibition in 1945 at the Galería Comte in Buenos Aires, the Asociación Arte Concreto Invención (AACI) was created. Using their art to showcase their political aspirations in regard to the newly formed regime of Juan Perón, the group believed abstract art could unite and be understood by all people, and therefore, be used to better the world. They looked to the European tradition of abstraction, but this political purpose for abstraction was a uniquely Argentine invention. This paper will explore how and why the group used the artistic technique of geometric abstraction to display their Communist values. It will also examine not only how the AACI and the future of Argentine abstraction were affected by the government censorship of Perón but how the group was successful in their resistance to the fascist dictator.

Characterization of Antibody Response and Cell-Mediated Immune Response to Seasonal Influenza Vaccination

Connor Grady, CURO Research Assistant
Dr. Ted M Ross, Infectious Diseases, College of Veterinary Medicine

Influenza virus infection is a disease of global concern, causing significant morbidity and mortality in many individuals. Annual seasonal influenza vaccination is the most effective way to reduce the risk of acquiring infection and is recommended for all individuals 6 months and older. A robust cell-mediated immune response to influenza infection is necessary for viral clearance and recovery. The purpose of this study is to quantify the frequency of CD154/$CD4^+$ and $CD8^+$ T cells, CD27 memory B cells, CD138 plasma cells, CD107a Natural Killer cells, $CD11b^+$ myeloid-lineage cells, and immunoglobulin lymphocytes derived from human peripheral blood mononuclear cells before and after influenza vaccination of a split inactivated tri/quadrivalent intramuscular vaccine. By using flow cytometry, cell populations can be analyzed by comparing cell frequencies before vaccination and 21 days post-vaccination. These cell populations can then be compared to antibody titers, determined by hemagglutination inhibition assay, against the strains included in the vaccine along with historical influenza strains to determine if there is a correlation between humoral and cellular immune response. Based on prior studies, it is expected that the frequency of all cells assessed will increase in response to influenza vaccination and that HAI titers will positively correlate with immune cell populations.

Reducing Homelessness in Atlanta

Ammishaddai Sully Grand-Jean
Dr. Christopher Cornwell, Economics, Terry College of Business

There are over 6,000 homeless people who reside in the City of Atlanta. Each homeless person costs tax payers about $40,000 a year, which includes emergency visits, prison, and police activities. Since homeless people do not own homes, it is difficult for them to obtain jobs and, as a result, they are trapped in the cycle of poverty. Homelessness doesn't only negatively affect the homeless, but also businesses and the local economy. Atlanta already has transitional housing programs that put homeless people in shelters that give them skills to prepare them to go back in the workforce and become home owners. Still, there are not enough resources available to reach the total homeless population. There are three policies that can positively aid in the reduction and prevention of homeless people in Atlanta: tax breaks offered by the state & local government for businesses who hire homeless people for at least 6 months; increased taxes on citizens and businesses that make $1 million or more a year and use the revenue to increase the reach of the current initiatives to reduce homelessness; and housing homeless people in the 46,000 vacant homes in Atlanta. Housing homeless people will prove to be best in reaching the total homeless population and is the most cost-effective and efficient out of the three policies. Atlanta should move to use its vacant homes to house homeless people and thus reduce the many costs that homeless people bring on the city.

Performance on a Measure of Multitasking is Related to Executive Function in Older Adults

Maria Granros, CURO Research Assistant
Dr. Steve Miller, Psychology, Franklin College of Arts and Sciences

Current research suggests that cognitive training may retard decline in attention, memory, and executive functions in older adults. Age related decline is normal for both mildly cognitively impaired and healthy older adults. Executive functions are the skills necessary for organization, execution of goals, and inhibition of compulsory actions. Specifically, executive dysfunction demonstrates difficulty in multitasking activities of everyday life. To examine the relationship between executive functions and performance on a task representative of multitasking abilities, a sample of older adults (n=20) played *Neuroracer*, a video game customized to train, challenge and measure multitasking ability over 12 visits, completing 20 trials each visit. The game required participants to drive a vehicle on a road while periodically and simultaneously responding to interjected symbols on the driving screen field. The difficulty level of each trial run changed specific to each participant using an algorithm that considered performance

on previous runs. The executive performance status of the participants was assessed using validated measures including DKEFS subtests Verbal Fluency, Color Word, and Trails DKEFS as measures of executive function. Correlation revealed that average latency did not correlate with the DKEFS measures (n(18)=-.300, p= .106). However, DKEFS scores were significantly related to average driving accuracy (n(18)=.594, p=.004) and final difficulty level (n (18)= .507, p= .011). Findings suggest that successful multitasking may be dependent on executive functioning. Findings thus support the testing of multitasking interventions as tools for cognitive enhancement in older adults.

Design of Gallate-Based Persistent Phosphors in the Short-Wave Infrared Region

John Green II, CURO Research Assistant
Dr. Zhengwei Pan, Environmental, Civil, Agricultural, and Mechanical Engineering, College of Engineering

Persistent luminescence is the ability of a material to continuously emit light after the excitation is ceased. This capability has had many breakthroughs in recent years, specifically with the persistent luminescence in the near-infrared (NIR; ~700–900 nm) and short-wave infrared (SWIR; ~900–1700 nm) spectral regions. Both NIR light and SWIR light are not visible to naked eye. Although significant progress has been made in NIR persistent luminescence, the research in SWIR persistent luminescence is particularly lacking and is where my research takes place. SWIR persistent luminescence can be applied in the field of biomedical imaging, photovoltaics, and night-vision. Rare-earth metals are the main emitters used in SWIR persistent phosphors because of their unique energy-level structures suitable for emitting SWIR light. This research lab particularly deals with gallate-based phosphors (gallium oxide compounds) that have appropriate electron traps to store excitation energy and subsequently release the energy to emitter. The goal of this research is to develop optimal SWIR persistent phosphors with the ability to give long and strong SWIR persistent luminescence emission.

Influence of Corrective Exercise Compliance on Physical Activity Levels and Perceived Functional Abilities

Morgan Green, CURO Honors Scholar, CURO Research Assistant
Dr. Cathleen Brown Crowell, Kinesiology, College of Education

One potential cause of physical inactivity, a leading risk behavior for many chronic diseases, is a history of athletic injury. Little research exists on how physical activity levels and perceived functional abilities change after injury. This study aims to determine if a corrective exercise program intervention, provided with minimal supervision, alters perception of function and sport participation after injury. By monitoring changes in physical activity level, compliance with a corrective exercise program and perception of function, we aim to gather information to further understand how injured athletes self-select to complete rehabilitation or not, and participate in activity or not, following injury. We hypothesize injured participants will report decreased levels of physical activity and an associated decline in perceived functional movement ability due to pain or injury. Following baseline movement screens, college-aged club sport athletes will complete weekly surveys detailing their participation in physical activity. Upon a lower extremity injury, participants will receive corrective exercises to complete as well as an additional weekly survey to assess compliance to the intervention and overall perception of lower extremity function. Chi-square or *t*-tests will be used to compare perception of function and level of activity between those injured participants who self-select to complete the corrective exercises and those who don't, controlling for injury severity. We anticipate the compliant injured individuals will see a quicker return to normal physical activity level. Therefore, the importance of aggressive treatment using corrective exercises should be heavily stressed as a primary prevention for long-term health issues.

Regional Brain Morphometry and Associated Cognitive Functions in Older Adults with Cardiovascular Disease

Luvika Gupta

Dr. Lawrence Sweet, Psychology, Franklin College of Arts and Sciences

Cardiovascular disease (CVD) describes a range of conditions that affect the ability of the heart and vascular system to supply sufficient blood flow throughout the body. Although research studies of older adults with CVD have consistently demonstrated increased risk of neurodegenerative disease, patterns of cognitive decline, associated structural brain changes, and the relationships between them remain under investigation. The aim of this study is to examine the relationship between cognitive decline and regional brain morphometry among older adults with CVD. As part of a larger study, 50 CVD patients and 46 age-matched controls underwent an MRI scan and neurocognitive testing using the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS). Using the software program FreeSurfer, we will analyze individual MRI data to determine cortical thickness in eight bilateral a priori regions of interest (ROI) in the dorsolateral prefrontal cortex (DLPFC), inferior parietal cortex (IPC), and posterior parietal cortex (PPC) that have been previously implicated in morphometry studies of CVD. Group differences will be tested using an Analysis of Variance (ANOVA). Relative to controls, it is hypothesized that a) the CVD group will demonstrate lower performance on the RBANS attention and visuoconstruction composite index scores, b) the attention index will significantly correlate positively with DLPFC and IPC regional thickness, and c) the visuoconstruction index will significantly correlate positively with DLPFC and PPC regional thickness. The results are expected to increase understanding of cognitive and neural changes associated with CVD.

Effects of Lutein on Vision and Cognition in Children

Sahl Hakim
Dr. Lisa Renzi Hammond, Psychology, Franklin College of Arts and Sciences

Lutein (L) is a carotenoid found predominantly in green, leafy vegetables and brightly colored fruits. Although humans cannot synthesize their own L, consumption of L-rich foods causes L to be deposited in a variety of body tissues, such as the neural retina and the frontal and occipital cortices of the brain. In neural tissue such as retina and brain, L is thought to perform a few important functions, one of which is to directly influence neural signaling. Past research suggests that increasing dietary L levels, either by consumption of L-rich foods or via supplementation, can cause increases in neural L levels as measured in the neural retina (as macular pigment, MP). As MP optical density increases, cognitive performance also increases, across the adult lifespan. Whether or not L status relates to cognitive function in younger participants undergoing rapid neurological development is not yet known. The purpose of this study was to test this hypothesis. School aged children (7-12 years) were recruited from the Athens-Clarke and surrounding county areas. Food diaries were used to determine L-rich food intakes, and the Woodcock Johnson test battery (III) was used to measure cognitive function. Visual processing speed and reaction time were measured psychophysically, and MP optical density was also measured. Analyses are ongoing, and results will be presented at the symposium. It is hypothesized that children with higher dietary intakes of L and higher MP optical density will have improved cognitive function, reaction times and processing speeds compared with children with low dietary intakes.

Southern Gothic Feminism: The Women of Flannery O'Connor's *Wise Blood* and the Women of the Bible

Halle Brooke Hammond, CURO Research Assistant
Dr. Hugh Ruppersburg, English, Franklin College of Arts and Sciences

Flannery O'Connor's 1952 novel *Wise Blood* features three predominant female characters, Sabbath Lily Hawks, Leora Watts, and Mrs. Flood. It uses attributes of the Southern Gothic genre in addition to biblical parallels in order to outline the demise of Hazel Motes and his Church Without Christ. The objective of this research project is to analyze the three female characters of *Wise Blood* in their relationships with the men of the novel (Hazel Motes, Asa Hawks, and Enoch Emery), and in their own parallels and contrasts to various women of the Bible, but including the Old and New Testaments, Virgin Mary, and Mary Magdalene from the life of Jesus Christ. Using

several texts, including *Collected Works* edition of Flannery O'Connor's work, which includes *Wise Blood* and her letters and essays, and the Bible, this project seeks to analyze the novel's Southern Gothic attributes from a Gothic feminist perspective. The women of the Bible and specifically their sins directly parallel the women of *Wise Blood* and their contributions to the demise of Hazel Motes, including his blindness and eventual death. The use of femininity in the novel contributes to its status as a Southern Gothic work. The South and its complicated relationship with feminism relies heavily on its connection to Christian religion and culture. Flannery O'Connor's work as a Southern Gothic writer provides an opportunity to analyze the impact of this culture on the South and its women.

Religious Terrorism and Weapons of Mass Destruction

Elizabeth Alexandra Hardister, CURO Honors Scholar, CURO Research Assistant
Dr. Seema Gahlaut, Center for International Trade and Security, School of Public and International Affairs

Proponents of the theory of "new terrorism" conflate the lethality of contemporary religious terrorist organizations to a heightened motivation and capacity to create mass fatalities, and thus, greater motivation and capability to acquire weapons of mass destruction. This theory cites the cosmic worldview of religious ideology as a significant condition that legitimizes the mass casualties and destruction potentially caused by these weapons. However, literature on conventional terrorism does not uniformly support the key assumption that religiously-affiliated terrorist organizations that hold purely religious goals produce greater numbers of fatalities than those with limited, strategic goals. The functional traits of religion that increase terrorist organizations' capacity to carry out violence and could potentially facilitate the acquisition and use of WMD were identified. Additionally, in light of the view that nuclear devices present the greatest potential for the advancement of the capacity to commit violence, information on a number of attempted acquisitions of nuclear material and weapons by terrorist organizations were compiled for analysis.

Fund Balances in Georgia's Cities

Jennifer Ashtyn Hardister, CURO Honors Scholar, CURO Research Assistant
Tracy Arner, Carl Vinson Institute of Government, Public Service and Outreach

Fund balances are equity in governmental funds, and their accumulation over time is determined in part by the line governments walk between their revenues and expenditures. With the issuance of GASB Statement 54 in 2009, the classification and reporting of these balances was clarified. However, there still remains a "policy void" regarding uses and amounts of these balances. One common recommendation is for governments to maintain an unrestricted fund balance of at least two months of general fund operating revenues or general fund operating expenditures. In this study, the various policies regarding fund balances in cities in Georgia and their compliance with these policies will be examined.

Dior to Disco: Second Wave Feminism and Fashion

Madeline Grace Harpham, CURO Research Assistant
Dr. Monica Sklar, Textiles and Merchandising, College of Family and Consumer Sciences

This research aims to establish a connection between the literature of second wave feminism, and the changes mainstream women's silhouettes undertook from the 1950s-1970s. During this time period, clothing changed dramatically; shifting from the rigid shape of the 1950s that exaggerated the female form, to the A-line, shorter mini-dress of the 60s, to the free-flowing silhouette of the hippie movement, to the streamlined androgyny of the 1970s. This study utilizes pertinent feminist literature from impactful writers such as Gloria Steinem, Betty Friedan, and Simone de Beauvoir, as well as a critical analysis of those writings, and *Vogue* magazines from the era to develop a literature review of fashion and feminism. Articles of clothing from the University of Georgia's Historic Clothing and Textiles Collection and the University of Minnesota's Goldstein Museum of Design establish the links between the messages of the media with the fashions of the time. Material culture and content analysis methods

highlight the relationship between the changing silhouettes of women's fashion in the 1950s-1970s, and the feminist movement. The transition of the fashionable silhouette for women from the feminine 'New Look' of the 1950s to the sexually ambiguous styles of the 1970s has linkages to the second wave feminist movement through literature, the fashion cycle, and cultural changes.

Do Transparent Whiteboards Promote Learning from Online Lectures in STEM?

Brendan Harris
Dr. Logan Fiorella, Educational Psychology and Institutional Technology, College of Education

The current study tested the effectiveness of the Learning Glass technology, which allows instructors to write a lecture while maintaining face-to-face contact with students using a transparent whiteboard. How do instructional methods using transparent whiteboards affect student learning in STEM subjects? To help address this question, 80 college students were asked to view a 10-minute video lecture about the human respiratory system. Participants were randomly assigned to one of two groups. Students in the conventional whiteboard group viewed the instructor draw diagrams on a conventional whiteboard, which requires the instructor to frequently turn his/her back to the camera throughout the lesson. Students in the transparent whiteboard group viewed the instructor draw the diagrams on a transparent whiteboard, which allows him/her to face the camera throughout the lesson. Participants were assessed on their understanding of the lesson both immediately and after a one-week delay. We also assessed their feelings of motivation and social engagement with the instructor. We predicted that the transparent whiteboard group would outperform the conventional whiteboard group on immediate and delayed tests of understanding. We also expected the transparent whiteboard group to report higher levels of motivation and social engagement. There is growing research that supports the idea that a direct view of the instructor may offer benefits for learning in STEM by establishing a stronger sense of social partnership with the instructor and providing better access to the instructor's eye gaze. This project will increase our understanding of how students learn from social cues in multimedia lessons.

Vector-Borne Disease Forecasting

Mallory Jessica Harris, Foundation Fellow
Dr. John M Drake, Ecology, Odum School of Ecology

Especially in resource-depleted areas, costly control efforts are often abandoned when case abatement is mistaken for true elimination. Resurgent epidemics can reverse decades of progress in disease elimination. Resurgence may be defined as a shift between two stable states: elimination and epidemic. We propose a non-parametric disease forecasting software that would detect a threat prior to the first resurgent outbreak and mobilize preemptive responses. These methods draw from the theory of critical slowing down, which states that as a system approaches the tipping point of disease resurgence, its ability to recover from slight perturbations decreases. This behavior results in characteristic changes in statistical indicators, including lag-1 autocorrelation, variance, and the first difference of variance, which can be detected as early warning signals of an approach to criticality. We apply the proposed techniques to several vector-borne disease systems. First, we develop a theoretical framework using stochastic modeling to predict the trajectory of each indicator. We quantify each test's sensitivity as the area under the receiver operating characteristic curve. Then, we validate our predictions by testing a monthly malaria data set for early warning signals of a 1993 resurgence event in Kericho, Kenya. We find that variance and the first difference of variance are promising indicators of critical transitions in vector-borne disease systems. Finally, we generate a simulation of the campaign to eliminate malaria from Haiti by the year 2020 and demonstrate how spatial early warning signal testing could facilitate more targeted, efficient interventions.

Understanding the Determinants of Seeking Medical Attention for Injury

Emma Harrison
Dr. Cathleen Brown Crowell, Kinesiology, College of Education

Multiple determinants may influence athletes to seek medical attention. However, it is unknown if athletes seek medical attention based on previous injuries. Our objective was to determine if there is

a significant relationship between frequency and severity of previous injuries with seeking medical attention for in-season injuries. Our participants were collegiate club rugby and ultimate frisbee athletes (n=39; 20 male, 19 female; age=20.8 ±1.6years, height=172.48±8.6cm, weight=74.1±15.6kg). Athletes underwent injury history screening prior to competitive seasons. Throughout the season, athletes reported injuries and specifics (e.g., date, anatomical location, type, time lost, and medical attention sought). Previous injury was defined as any self-reported, medically diagnosed injury or discomfort affecting sport participation. A point biserial correlation was used to determine association between previous injury frequency and seeking medical attention for in-season injury. A chi-square test was used to determine association between previous injury severity (>3 weeks lost) and seeking medical attention for in-season injury. There was significant correlation between previous injury frequency and seeking medical attention for an in-season injury (rpb=0.37; p=.02), as well as significant association between previous injury severity and seeking medical attention for an in-season injury (phi=0.365; p=.02). Statistically significant weak-to-moderate correlation exists between previous injury frequency and severity and obtaining medical attention for an in-season injury. Athletes who seek medical attention for in-season injuries are likely to have a previous history of athletic injuries and/or to have lost at least 3 weeks of athletic participation due to an injury.

Investigation into Surface Glycan Variation in *Campylobacter fetus* Species

Annie Hass, CURO Research Assistant
Dr. Christine Szymanski, Microbiology, Franklin College of Arts and Sciences

The *Campylobacter* genus consists of species causing periodontitis, spontaneous abortions, and diarrhea. This research focuses on *Campylobacter fetus* species known to cause spontaneous abortions in livestock and recently associated with diarrheal disease and rare cases of human fatality. The N-linked protein glycosylation (Pgl) pathway is conserved among all campylobacters and influences a wide range of cellular functions. In *C. fetus*, the biosynthetic enzymes in this pathway create one major N-glycan structure, while the enzymes from a bacteriophage operon known as gtr create a second antigenic variant of the N-glycan. Normally the gtr operon is involved in O-antigen serotype conversion of lipopolysaccharide and prevention of superinfection. In *C. fetus*, the operon appears to be mobile in the genome resulting in mixed populations of gtr positive and negative cells. We hypothesize that the mobility of the operon may be dependent on stressors such as antibiotics and that the mixed antigenic population may be beneficial for pathogenesis. We will be testing different environmental conditions, such as antibiotic stress, to see what induces mobility of the gtr operon. In parallel we will be performing mutagenesis on putative mobility factors and pgl/gtr genes to assess pathogenesis in a wax moth larvae model.

Developing a Protocol for Large-Scale Toxicity Assays Using Flow Cytometry

Cord Helmken, CURO Research Assistant
Dr. Art Edison, Genetics, Franklin College of Arts and Sciences

Caenorhabditis elegans are nematodes that have the ability detoxify the environments in which they thrive through the employment of various mechanisms. In this study, I seek to develop a protocol for large-scale toxicity assays using the Union Biometrica BioSorter and to use this protocol to assay for the detoxification ability of *C. elegans* glycosyltransferase mutant strains in response to the toxin 1-hydroxyphenazine (1-HP). Because *C. elegans* utilize glycosylation in order to neutralize 1-HP, we hypothesize that some GT mutant strains will exhibit increased susceptibility to the toxin compared to the wild type N2 strain. In this study, wild type N2 and GT mutant strain *C. elegans* were exposed to a gradient of 1-HP concentrations then treated with a fluorescent nucleotide stain and analyzed using the Union Biometrica BioSorter, a large-particle flow cytometry device. Results from this experiment will be used to assess and improve current protocols and direct future experiments focused on the glycosylation ability of *C. elegans*.

Fifty Years In: Just Warming Up: How the Nuclear Nonproliferation Treaty Can Effectively Combat Global Warming

Cameron Ward Henderson, CURO Research Assistant

Dr. Sara Kutchesfahani, International Affairs, School of Public and International Affairs

As the Nuclear Nonproliferation Treaty (NPT) nears its fiftieth anniversary, now is a critical time to reflect on the success of the treaty and where it can find new relevance in the twenty-first century. At the same time, climate change presents a newfound necessity for clean energy and international coordination. The convergence of these two events is the focus of this research. This paper attempts to fill a gap in climate policy research by analyzing how Article IV (the pursuit of civilian nuclear energy) of the NPT contains sufficient language to allow the nuclear nonproliferation regime to encourage and provide safety and security measures to respond to the global call for nuclear energy as a low carbon alternative to traditional fossil fuel power generation. Considering the ecological imperative to expand civilian nuclear power generation, the NPT will need to play a critical role in ensuring the safe transport of fissile material and the implementation of relevant security measures. The growing role of nuclear energy will present both a challenge and an opportunity for nuclear nonproliferation, but by capitalizing on the opportunity, NPT signatory states can guarantee that the NPT will maintain relevance in the twenty-first century and provide a new, more benevolent, face to nuclear energy.

Assessing Toxicity and Contamination in Lake Herrick

Sarah Hensey, CURO Research Assistant
Dr. Susan Wilde, Forestry, Warnell School of Forestry and Natural Resources

Located on the University of Georgia campus, Lake Herrick serves as a valuable recreational and institutional resource. In recent years, use of the lake by the public has been restricted due to declining water quality. High nutrient levels in storm water runoff have been linked to seasonal toxic algal blooms. This study aimed to monitor these seasonal algal blooms and assess the present levels of contamination and toxicity in Lake Herrick in comparison to previously collected data. Weekly water parameters of temperature, dissolved oxygen, and pH were recorded and water samples were screened microscopically for potentially toxic cyanobacterial species. Fecal coliform were assessed from the water samples using petrifilm *E. coli*/coliform count plates to evaluate contamination levels. In addition, toxicity was assessed through chronic and acute reproduction and survival tests of *Ceriodaphnia dubia*. We anticipated the presence of a toxic algal bloom in the warmer months of August through October but there was no persistent bloom due to a lack of rainfall events. We recorded a small-scale bloom of *Aphanizomenon* cyanobacteria, of which most forms are toxic, during October 2016. A frozen water sample from an *Anabaena planctonica* bloom (157,000 cells/mL) during a similar time in 2015 resulted in significant reductions in *Ceriodaphnia dubia* reproduction and survival in both acute and chronic tests ($p<0.05$). Our current results suggest that Lake Herrick is continuing to experience infrequent seasonal algal blooms resulting in harmful levels of toxicity. The water quality data from this study can help guide future remediation plans.

Biochemical Investigations of Congenital Disorders of N-Linked Glycosylation

Laurel Hiatt, Foundation Fellow, CURO Research Assistant
Dr. Richard Steet, Biochemistry and Molecular Biology, Franklin College of Arts and Sciences

Congenital Disorders of glycosylation are a group of rare inherited diseases caused by defects within the N-linked glycosylation pathway. Although decreased glycoprotein glycosylation is a common feature of these disorders, little is known about which proteins are most sensitive to loss of N-linked glycosylation and how the changes in glycosylation status affect their cellular function. These questions are being address utilizing new tools such CRISPR-Cas9 generated null cells for two subunits (STT3A and STT3B) of the OST complex, the enzyme complex responsible for adding N-glycans to newly synthesized glycoproteins. To profile how decreased N-glycosylation affects the cell surface abundance of glycoproteins, a new tagging methodology called SEEL (selective exo-enzymatic labeling) is being used. This method uses recombinant glycosyltransferases and biotin-modified nucleotide-sugars to tag cell surface glycoproteins via their terminal sugar chains. These glycoproteins can then be enriched, identified and

quantified to determine how impaired N-glycosylation affects their surface localization. Results to date demonstrate striking changes in the abundance of cell surface glycoproteins in the STT3A-null and STT3B-null cells. These data show that many of the sensitive glycoproteins that have been identified are involved in cell adhesion and migration including several integrins. Subsequent experiments involved performing scratch healing assays to determine whether the changes in cell surface integrins correlate with altered wound closure in the STT3A and STT3B cells. Surprisingly, it was observed that the motility of STT3A cells into the wounded area increased while the migration of the STT3B cells decreased in comparison to the wild type cells.

Investigating the Role of HPG27_395 in *Helicobacter pylori*

Jonathan David Hill, CURO Research Assistant
Dr. Timothy Hoover, Microbiology, Franklin College of Arts and Sciences

Helicobacter pylori is an Epsilon-proteobacterium that colonizes the human stomach and causes diseases such as peptic ulcers, gastritis, and gastric cancer. *H. pylori* synthesizes 2-6 flagella at a single cell pole and is necessary for colonization. In *H. pylori* strain G27, HPG27_395 is annotated as a hypothetical protein. In many Epsilon-proteobacteria, this gene is observed to be clustered with other flagella genes, and positioned immediately downstream of *flhF* and *flhG*. Both FlhF and FlhG have been identified in other model organisms to be involved in proper localization and numerical regulation of the flagellum. The role of HPG27_395 in flagella biosynthesis is currently unknown, but the relative position to *flhF* and *flhG* suggests this gene encodes a protein that is necessary for flagella biosynthesis. Therefore, I aim to identify the function of HPG27_395 during flagella biosynthesis. To begin our investigation, a counter selection method will be used to construct a HPG27_395 deletion mutant (ΔHPG27_395). Following the verification of the mutant, motility defects will be assessed using a semi-solid medium and flagella patterns will be visualized using Transmission Electron Microscopy. Subsequently, these two experiments will provide insight as to how HPG27_395 affects flagella biosynthesis and initiate future investigations.

The Necessity for Ethics in Developing Adaptive Management Strategies for Water Scarcity

Taylor Alicia Hill, CURO Honors Scholar, CURO Research Assistant
Dr. Don Nelson, Anthropology, Franklin College of Arts and Sciences

Water is a limited resource and, due to the accelerated impacts of climate change, is expected to become scarce in the near future. Adaptive management is an interdisciplinary set of guidelines that are instated to formulate solutions to multifaceted issues, such as that of sustainable water management. Moving beyond an economic efficiency approach, adaptive management promotes the importance of participation, learning, and ethics. Although the importance of ethics is acknowledged, there are few empirical examples of how they may be included in water management. This project, based in the Vale do Jaguaribe and Paraiba do Sul watersheds in Brazil, applies an ethical lens as a tool in the development of water governance strategies for the basins, which face drought risks due to climate change. The goal of the current portion of the project is to develop a conceptual framework for analyzing water ethics, which will include the categories of social, economic, and ecological values. This framework will be used to assess the management settings in the two watersheds. The significance of this project is, in part, making ethics in governance explicit, rather than implicit. By making ethics explicit, not only can they be used as a framework by which to compare values in governance and as a framework in future management decisions, it also opens a forum for discussion of water values such as quality, quantity, as well as risk management regarding people, environment, and economy.

Shoring Up Dam Safety: Risk Assessment Via Simplified Inundation Mapping

Robert Erwin Hines, CURO Research Assistant
Shana Jones, Carl Vinson Institute of Government, Public Service and Outreach

Dam break emergency action plans (EAP) are essential for dam break emergency response because they allow local authorities to issue warnings to at risk areas, identify infrastructure

which may be compromised by flooding, and prepare emergency services to respond to affected flood areas quickly. Nationally, the high cost of formal, unsteady state inundation mapping studies prevents dam owners with limited resources from preparing EAPs. This study aimed to assess the capacity of simplified inundation maps to inform EAP construction. Simplified inundation maps were expected to be accurate enough for EAP development when formal, unsteady state models are unavailable. To assess simplified map acceptability, this project first compiled simplified inundation mapping recommendations to prepare a dam break modeling method using Arc GIS mapping techniques and HEC-RAS powered steady state modeling. Second, Federal Emergency Management Agency recommendations for EAP development were assessed to identify road crossing and building structures as the most relevant point of practical interest on inundation maps for EAP implementation. Third, simplified maps were qualitatively compared to formal, unsteady state maps, kindly provided by the Georgia Soil and Water Commission, to identify differences in potential emergency response operations. Developed case studies indicated that simplified inundation mapping technologies either overpredicted or underpredicted the extent of the flooding and would either overly concentrate or disperse emergency resources. However, because these case studies do not formally assess risk, future research should consider assessing risk by comparing potential simplified inundation map EAPs to historic emergency response operations performed without prewritten EAPs.

Trilobite Coquina in Siliceous Concretions from the Middle Cambrian Conasauga Formation, Southeastern USA

Zaak Alvin Hinz
Dr. Sally Walker, Geology, Franklin College of Arts and Sciences

Before the Cambrian period, life on Earth was extremely different from life today. However, approximately 540 million years ago, rapid diversification of animal life took place. This Cambrian explosion led to the evolution of many different animal phyla, some of which are preserved within shales and siliceous concretions within the Conasauga Formation, southeastern USA. Previously, it was asserted that the concretions have abundant, diverse, and well-preserved skeletal and soft-bodied organisms in three-dimensional relief. However, there was little to no quantitative data to substantiate this claim. The purpose of my project is to collect quantitative data to determine whether the concretions contain diverse and well-preserved fossils. I examined 100 concretions, which yielded mostly trilobite fragments (99.3%, n=3356), and rarely brachiopod and hyolith fragments (0.4%, n=13 and 0.3%, n=9, respectively). Trilobite fragments were divided into categories based on morphology: complete skeleton, complete cephalon, crandium, glabella, fixigena, librigena, complete thorax, thorax segments, complete axial lobe, and pygidium. The most abundant type was cephalon (head) fragments (21% librigena, n=719, 12% cranidia, n=417). All brachiopod fragments were single valves and all hyolith fragments were portions of its conical shell. These concretions represent a low diversity assemblage of mostly epibenthic organisms, and not a highly diverse or well-preserved one as previously reported. I also anticipate results from stable oxygen isotope analysis to help determine if these concretions formed in seawater, which would be consistent with their formation Cambrian seas.

Development of a Droplet Digital PCR Assay for Pre-NGS Quality Assessment of DNA from FFPE Specimens

Jessica Ziling Ho, Foundation Fellow, CURO Research Assistant
Dr. Lance Wells, Biochemistry and Molecular Biology, Franklin College of Arts and Sciences

Because formalin-fixed, paraffin-embedded (FFPE) tissue samples undergo a preservation process that damages nucleic acids, they are not ideal candidates for downstream molecular studies. However, DNA extracted from FFPE specimens is often screened for hotspot mutations in cancer-related genes via next-generation sequencing (NGS), which requires a substantial input of quality DNA and is resource-intensive. Our work focused on developing a dual size amplicon-based ddPCR assay that would serve as a pre-NGS quality control for FFPE sample-derived DNA. We employed two primer sets targeting non-overlapping sites on the *RPP30* gene and defined amplicons of 109 base pairs (bp) and 195 bp. DNA was extracted from 84 FFPE tumor

specimens, and ddPCR was accomplished with Bio-Rad's QX200 Droplet Digital System and C1000 Thermal Touch Cycler. Data were processed with QuantaSoft software. To verify that both primer sets' PCR efficiencies were close to 100%, the ddPCR assay was first run with placenta DNA. Analysis of the data revealed that for most FFPE specimens, 24 ng of DNA yielded enough amplifiable copies for amplicon-based NGS testing. We noted a positive correlation between the amount of amplifiable *RPP30*-195 bp targets and the amount of library generated for NGS. There was also a significant reduction in the quality of NGS results for DNA samples with a RPP30-195 bp:*RPP30*-190 bp ratio of less than 0.3. The preliminary data suggest that our *RPP30* ddPCR assay is an inexpensive and accurate way to assess the quality of FFPE sample-derived DNA and to predict the likelihood of amplicon-based NGS success.

Genotype-Phenotype Correlations for POMGNT1 and POMGNT2 in Dystroglycanopathies

Jessica Ziling Ho, Foundation Fellow, CURO Research Assistant
Dr. Lance Wells, Biochemistry and Molecular Biology, Franklin College of Arts and Sciences

Dystroglycanopathies are a subtype of congenital muscular dystrophy that result from hypoglycosylation of α-dystroglycan (α-DG). POMGNT1 and POMGNT2 are glycosyltransferases involved in synthesizing O-mannosyl glycans on α-DG. Our work examines the role of the R311G, R605H, P303L, and D556N mutations in POMGNT1 and the R157H, G412V, and R445* mutations in POMGNT2 to define a genotype-phenotype correlation. The POMGNT2 mutations result in Walker Warburg Syndrome, the severest dystroglycanopathy. POMGNT1 mutations R311G, R605H, and P303L cause Muscle Eye Brain disease (MEB) and the D556N mutation causes limb-girdle muscular dystrophy (LGMD), a milder dystroglycanopathy with no neurological symptoms. The effects of those mutations on enzyme characteristics are not well established in the literature. To identify mutation-derived changes in enzyme kinetics and stability, HEK293F cells were transfected with mutant plasmids generated by QuikChange II Site-Directed mutagenesis. Preliminary data showed that POMGNT1 mutants maintained enzyme expression, but POMGNT2 mutants did not. Radiolabel transfer assays indicated that the two POMGNT1 mutants linked to MEB were kinetically dead while the one linked to LGMD was still kinetically active. Promega's UDP-GloTM assay was performed on the LGMD mutant, which exhibited decreased activity compared to wildtype POMGNT1. A SYPRO Orange thermal shift assay revealed the POMGNT1 mutants to be thermodynamically stable. We are currently investigating the ability of the mutants to rescue POMGNT1 or POMGNT2 knockout cell lines for IIH6 reactivity, laminin binding, and Lassa pseudovirus entry. Understanding genotype-phenotype correlations in those glycosyltransferases will facilitate the design of more targeted treatments for individuals based on the mutation(s) they carry.

Exploring Linkages between Environmental Degradation and Human Rights

Maggie Holland, CURO Research Assistant
Dr. Puneet Dwivedi, Forestry, Warnell School of Forestry and Natural Resources

Human rights are vital for ensuring sustainable development. A culture which emphasizes an integrated growth paradigm under the broad umbrella of sustainability principles must have a proper place for political and civil rights for ensuring equitable human development and transparent accounting of environmental impacts. However, the relationship between changes in the status of human rights over time on human development and environmental quality is poorly understood. A need exists to deliberate on these relationships for strengthening current policy prescriptions that will ultimately ensure simultaneous benefits to people and resources worldwide. This will also help ensure inclusivity of global sustainable development agenda. This study will ascertain changes in the status of human rights across countries and how these changes simultaneously correspond to any changes in environmental indicators and human development over time. For environmental indicators, I will focus on several factors including air quality. For human development, I will use UNDP's Human Development Indices. For human rights, I will use data from the Freedom House. By observing how

human development levels pair with the status of freedom within a country and how these variable together correlate with indicators of environmental degradation, I will establish a link between human advancement, human rights securities, and environmental degradation. An integration of human rights securities and environmental protection policies should be more congruent through policies which address both environmental sanctity and access to human rights and this study will demonstrate the importance of this overlap.

Protospacer Structure and Cas Protein Function in Adaptation of the *Streptococcus thermophilus* Type II-A CRISPR-Cas System

Erin Hollander, Foundation Fellow, CURO Summer Fellow, CURO Research Assistant
Dr. Michael Terns, Biochemistry and Molecular Biology, Franklin College of Arts and Sciences

The CRISPR-Cas system works through a three-stage process of adaptation, expression, and defense, in which a "spacer" from an invader is incorporated into the genome of the host organism, transcribed into CRISPR RNAs, and combined with Cas proteins to recognize and cleave the invader upon subsequent attack. My work focuses on the Type II-A CRISPR-Cas system of *S. thermophilus*, a key bacterium used in the dairy industry, which contains four Cas proteins: Cas1, Cas2, Csn2, and Cas9. My current research project focuses on determining how the Cas proteins, CRISPR array, and invading nucleic acid interact in vitro to accomplish adaptation. Four protospacers (precursors to spacers) were tested for their ability to integrate into a plasmid containing a basic CRISPR array using various combinations of Cas proteins to determine the minimum necessary for integration. After adaptation assays, bands of possible adaptation were amplified and sequenced to determine the orientation of their integration into the CRISPR array. Adaptation could be completed using only Cas1 and Cas2, with the addition of Csn2 and Cas9 not providing any significant benefit. All four protospacers were able to integrate into both the plasmid containing the CRISPR array and the empty vector, and all four possible half-site integration orientations were observed. The lack of specificity found in these assays indicates there may be additional factors in vivo. With only four proteins, this system has great potential for a broad range of applications. Better understanding of adaptation is a crucial step in making these applications a reality.

Nitric Oxide Releasing Urinary Catheters as a Method to Prevent Urinary Tract Infections

Katie Homeyer, CURO Research Assistant
Dr. Hitesh Handa, Chemical, Materials, and Biomedical Engineering, College of Engineering

The chance of bacterial infection in urinary catheters increases by 3-6% each day the catheter is in place, approximately 50% after ten days, and over 90% after 28 days. 500,000 to 700,000 catheter associated urinary tract infections (CAUTIs) occur each year. Treatment of these infections amounts to over $350 million each year; therefore, there is a dire need to decrease the risk of bacterial infection from the placement of urinary catheters. Nitric oxide (NO) is one of the body's natural defense mechanism against bacteria and has been proven to effectively inhibit biofilm formation, the principal cause of CAUTIs. Consequently, this project aimed to create urinary catheters impregnated with S-Nitroso-N-acetylpenicillamine (SNAP), a NO donor, to develop a NO-releasing catheter. Three concentrations of the NO donor were incorporated into commercial silicone catheters and evaluated for their NO releasing properties, leaching and antibacterial activity. These properties were measured using various methods, such as chemiluminescence, UV-Vis spectrophotometer, and bacteria studies, to identify the optimal concentration that demonstrated the greatest NO release and greatest reduction in viable bacteria. The prepared catheters produced NO surface-fluxes > 0.5 X 10^{-10} $mol\ min^{-1}cm^{-2}$ for over ten days under physiological conditions, with minimal SNAP leaching from the surface of the catheter. These devices are proven to significantly reduce biofilm formation on the surface of the catheter over a 72-hour period by CAUTI causing bacteria species. Thus, NO-releasing catheters provide a successful approach to significantly reduce biofilm formation on catheters, and decreasing the risk of CAUTIs.

Multi-Rotor Marsupial Drone System for Point Cloud Data Processing

Peter Hong, CURO Research Assistant
Michael Anthony Piseno
Dr. Adarsh Kumar Chaurasia, Engineering, College of Engineering

With autonomous and multirotor technology becoming increasingly developed, task-specific applications for these are becoming more relevant. However, there are also complications with time-efficiency and accuracy of modern drone systems. The Multirotor Marsupial Drone System (MMDS) utilizes algorithms to autonomously coordinate multiple drones using Point Cloud data to construct models of objects in 3-D space. We will be using a depth-sensing camera and Intel's RealSense software development kit to integrate 3-D mapping capabilities into our drone system. We will measure the effectiveness of the MMDS versus a single drone in a controlled environment, and compare the error of the Point Cloud 3-D model. This will allow us to refine our algorithm to more efficiently model 3-D space. We expect to find that the single drone will have more distortion in the 3-D model when compared with the MMDS. We also predict that the MMDS will be more cost-efficient in completing its task with respect to time. Possible applications of the MMDS include integrated multi-satellite communication in orbit, mapping ocean currents, mapping buildings in dangerous areas, and monitoring soil erosion in agriculture.

Analogies between Numbers and Polynomials

Jackson Hopper, CURO Research Assistant
Dr. Paul Pollack, Mathematics, Franklin College of Arts and Sciences

Polynomials have several properties in common with the more familiar natural numbers. One example is that both are unique products of prime divisors. An open question in algebraic number theory is to find the extent to which analogies hold between deeper number theoretic properties of the two sets. One such question asks about the digital representation of numbers, which is related to the natural structure of polynomials. We have previously strengthened a theorem about digitally delicate prime numbers, or numbers that become composite if any single digit is changed. We asked a similar question of polynomials, finding that infinitely many prime polynomials are digitally delicate. We also study the growth of the polynomial Carmichael function, which gives algebraic information about the polynomials, in analogy with the Carmichael function for natural numbers. We have found that the function grows much slower for some polynomials than it does for natural numbers. We are currently investigating the typical behavior, and expect it to grow slower as well.

Diachronic Perspectives on Human Diet Variation in Greek, Roman, and Medieval Albania

Rachel N Horton, CURO Research Assistant
Dr. Laurie Reitsema, Anthropology, Franklin College of Arts and Sciences

Carbon and nitrogen stable isotope analysis of skeletal remains offers information about past human diet, which may be unavailable or incomplete in historical accounts. We assess carbon ($\delta^{13}C$) and nitrogen ($\delta^{15}N$) stable isotope ratios from human bone collagen to interpret paleodiet from two sites in present-day Albania: a rural village neighboring the Greek colony Apollonia (~5^{th}-4^{th} century BC) (n=11) and a more urban settlement, Durres (n=30), occupied since its foundation (7^{th} century BC) to modern day. Four animal bones are used for comparison. We test the null hypotheses that there are no isotopic differences between sites during the Archaic-Hellenistic period, no differences between time periods at Durres, and no differences between sexes in individual sites/periods. Mean ($\pm$SD) $\delta^{13}C$ and $\delta^{15}N$ values are -18.7$\pm$1.3 and 9.1$\pm$1.6 respectively at Durres, -19.4$\pm$1.0 and 9.8$\pm$1.3 at Apollonia, and -20.9$\pm$1.0 and 6.7$\pm$1.5 among animals. Nonparametric Kruskal-Wallis tests show no significant sex-based differences at Durres ($\delta^{15}N$, p=0.201; $\delta^{13}C$, p=0.227), no differences between sites ($\delta^{15}N$, p=0.815; $\delta^{13}C$, p=0.212), and no differences between Durres time periods ($\delta^{15}N$, p=0.299; $\delta^{13}C$, p=0.426). Diet at both sites comprises terrestrial and marine protein. Two individuals at Durres show isotopic values similar to fauna, suggesting a vegan diet. Apollonian village data show potential intrasite variations, suggesting some individuals may have originated

from another region or cultural background. Reconstructing past human diet is necessary for understanding, at broad temporal and regional scales, how people are linked to their environment through culturally mediated foodways.

Effects of a PUFA-Rich Diet on Coagulation and Inflammation Markers in Healthy Adults

Megan Houston, CURO Research Assistant
Dr. Jamie A Cooper, Foods and Nutrition, College of Family and Consumer Sciences

Saturated fatty acids (SFA), in contrast to polyunsaturated fatty acids (PUFA), are associated with increased risk of chronic diseases by elevating blood pressure, cholesterol, and inflammation and coagulation potential. To test whether a diet rich in PUFAs can negate the potentially harmful health effects of eating occasional meals rich in SFAs. 25 sedentary, normal weight adults were randomized into a treatment or control group. All participants were put on the same 3-day lead-in diet followed by a pre-diet visit (v1) where they were given a high-fat meal rich in SFAs for breakfast and lunch. Fasting and postprandial blood draws were taken for 8h. Participants then completed a 7-day diet rich in PUFAs (21% of total energy) or a control diet (7% of total energy as PUFAs) followed by a post-diet visit (v2) identical to v1. Plasminogen Activator Inhibitor-1 (PAI-1) (coagulation marker) and Tumor Necrosis Factor Alpha (TNF-α) (inflammation marker) were measured at both visits. Average changes in fasting PAI-I from v1 to v2 were not different between the two groups (-1.69±4.37 vs. -3.88±11.71ng/mL for PUFA vs. control, respectively). However, there was a significant difference in the change in fasting TNF-α from v1 to v2 for PUFA vs. control (0.88±0.41 vs. -1.85±0.99pg/mL, respectively; p=0.01). Compared to a control diet, the PUFA-rich diet did not lead to changes in PAI-I, but did elevate TNF-α concentrations. Since we only measured one inflammatory marker, conclusions about compensatory effects of PUFA-rich diets need to be explored further.

Genetic Determinants of Intracellular Survival and Growth of *Bordetella pertussis*

Katie Howard, CURO Research Assistant
Dr. Eric T Harvill, Infectious Diseases, College of Veterinary Medicine

Bordetella pertussis is a respiratory pathogen associated with the infant disease whooping cough. Although vaccines are mostly effective, there is growing concern that *B. pertussis* is reemerging through unknown mechanisms, even in highly vaccinated populations. Due to this, there is an increasing need for novel treatment. Our preliminary results have shown that *Bordetella* species utilize intracellular survival within host immune cells as the mechanism for persisting at undetected levels. This could explain vaccine failure and the increased persistence of clinical disease. From our 20 candidate genes, 5 constructions have been finalized and 15 genes are half way completed. While constructing the clones, we studied 30 mutants to determine their ability to survive inside immune cells. The mutant that showed most promise was RB50Δ*bsr*, a strain of *Bordetella* species lacking the gene encoding for a small regulator. Preliminary results showed that the presence of this gene is required for persistence of *Bordetella bronchiseptica*, an established model organism for *B. pertussis*, in mice: RB50Δ*bsr* was completely cleared from all organs, while wildtype *B. bronchiseptica* colonized chronically. When studying the immune response, we detected that the strains evoked different immune responses. We hypothesized that as there is a difference in the adaptive immunity, challenging immunocompromised mice with RB50Δ*bsr* should lead to severe, systemic disease, which we have confirmed experimentally. The systemic dissemination can be explained by RB50Δ*bsr* having greater recovery from macrophages and using this as a method of transport throughout the body.

Characterization of Cas4 Activity in the CRISPR-Cas Systems of Pyrococcus furiosus

Jesse Hu, CURO Summer Fellow
Dr. Michael Terns, Biochemistry and Molecular Biology, Franklin College of Arts and Sciences

Bacteria and archaea have evolved extensive protective systems to defend against genetic invaders. One component of this defense is

CRISPR-Cas (clustered regularly interspaced short palindromic repeats–CRISPR-associated), an adaptive prokaryotic immune system found in nearly all archaea and half of bacteria. This system is composed of a genomic CRISPR array and associated Cas proteins. The CRISPR array affords memory of past infections and contains identical repeats separated by variable sequences known as spacers, which are derived from foreign nucleic acids. CRISPR-Cas functions in three stages: adaptation, CRISPR RNA (crRNA) biogenesis, and crRNA-guided interference. During adaptation, new spacers are captured from the invader and incorporated into the CRISPR array. The CRISPR array is then transcribed during crRNA biogenesis, and the transcript is processed to generate small crRNAs complementary to invader DNA. Finally, during interference, the crRNA guides Cas proteins to the invader, cleaving foreign genetic materials. It has been previously demonstrated that two universally conserved proteins, Cas1 and Cas2, are necessary for the integration of spacers during adaptation. Recent unpublished work in the Terns lab using the model organism *Pyrococcus furiosus* (*Pfu*) has uncovered a requirement for a third, highly conserved Cas protein, (Cas4), in mediating adaptation. Through in vitro assays, we aim to elucidate the role of the *Pfu* Cas4 protein in spacer integration into CRISPR loci, thereby clarifying our understanding of prokaryotic adaptive immunity against viruses and other mobile genetic elements.

A Comparison of the Catalytic Activity of Tryptophan Synthase from *Salmonella* and *Photobacterium* at Various Temperatures and Pressures

Eric Wayne Hua, CURO Research Assistant
Devanshi Nayak
Dr. Robert S Phillips, Chemistry, Franklin College of Arts and Sciences

The purpose of this experiment is to determine the effect of various temperatures and pressures on activity of samples of the enzyme tryptophan synthase isolated from two different organisms, *Salmonella typhimurium* (PEBA) and *Photobacterium profundum* (Ppro). This significance of this research study lies in its capacity to enlighten our understanding of the structure and function of tryptophan synthase, which synthesizes an amino acid invaluable to the proteins and biochemical pathways essential for the sustenance of all living organisms. With increasing temperature, the catalytic properties of enzymes typically increase. However, since *Photobacterium* optimally grows in the cold depths of the sea, it is hypothesized that the optimal temperature range for the Ppro tryptophan synthase enzyme will be lower than expected. It is hypothesized that the optimal pressure for maximum enzyme activity should approximate the homeostatic pressure within the organism. Because *Photobacterium* is acclimated to extreme depths, the Ppro enzyme is hypothesized to maintain functionality at higher pressures, while maintaining sound function at normal atmospheric pressure. To conduct the experiment, first a sufficient amount of cells were cultivated from the cell culture. After cultivation, autoclaving, and sonication, the proteins were then purified through a phenyl sepharose column. A reagent solution and buffer were inserted in a spectrophotometer with the added enzyme, and the absorbance was measured over time to ascertain the enzyme's activity. Results at this time for enzymes from both organisms are congruent with those hypothesized. Tryptophan synthase activity peaks at the climate conditions that its organism is acclimated to.

Desires for Difference: Tastes and Collecting of Later Nineteenth-Century American Paintings

Catherine J Huff, CURO Research Assistant
Dr. Alisa Luxenberg, Art, Lamar Dodd School of Art, Franklin College of Arts and Sciences

During the latter half of the nineteenth century, the United States experienced unprecedented shifts into modernity as technology and industry expanded, resulting in changing lifestyles for many Americans. Collecting fine art became more desirable and accessible for the growing upper class, and American painting was especially sought. The evolution of taste during this period is thought to have responded to larger societal shifts, and is frequently reflected through the history of ownership of a single painting or the patronage of a single artist's production. Through new research on a small collection of little-studied American later 19th-century paintings recently gifted to a university museum, this paper will consider the

ways in which collectors of these paintings reflected evolving American tastes in fine art. It seeks to understand what type of collector was attracted to these kinds of paintings and how their interests might have differed over time. This new research includes formal analysis, provenance, market history, exhibition history and critical reception for these paintings. It will attend to similar qualities or evidentiary connections between them, as several of their artists knew each other and shared similar patrons. While the research primarily explores how preferences in American art collecting may have reflected the historical context of the 1880s-1900, this research also hopes to compare these paintings' later 20th-century collectors to their predecessors a century earlier.

Development of an Inducible Histone Methyltransferase System to Analyze Establishment of Repressed Chromatin Domains in *Neurospora crassa*

Mallorie Lee Huff, CURO Research Assistant
Dr. Zachary A Lewis, Microbiology, Franklin College of Arts and Sciences

H3K27me3 is a molecular hallmark of facultative heterochromatin and results in stable repression of silenced genes. Regulation of H3K27 plays an important role in X-chromosome inactivation and stem cell fate; alternatively, aberrant H3K27me3 is observed in certain types of cancer. Producing an effective model in which to study H3K27me3 deposition may provide insight into the activity of Polycomb Repressive Complex 2 (PRC2), a highly conserved histone H3 lysine 27 methyltransferase. Suz12, a component of PRC2, is essential for catalytic activity. Our method to study H3K27me3 in *Neurospora crassa* involves constructing a controlled system through inserting inducible promoters and a FLAG epitope tag in front of suz12 and transforming them into *Neurospora crassa* through linearized *E. coli* plasmids. Verification of the putative inducible systems will include western blotting with FLAG antibodies, ChIP with H3K27me3 antibodies followed by Illumina sequencing (ChIP-seq). The promoters undergoing transformation are Ptcu-1, Pccg-1, and Pqa-2. The aim of this project is to investigate currently uncharacterized H327me3 kinetics by controlling suz12 expression. Monitoring the spatial and temporal dynamics of H3K27me3 establishment will allow us to predict when PRC2 is recruited. Successful completion of this project will provide insights into a conserved enzymatic complex with important implications in human health and disease.

Genomic Editing of *Neurospora crassa* as a Tool for Studying Circadian Cycle Synchronization

Brooke Hull, CURO Research Assistant
Dr. Jonathan Arnold, Genetics, Franklin College of Arts and Sciences

Circadian rhythms are a well-characterized emergent property in *Neurospora crassa* with known responses to external factors, such as temperature and light, but the effect of intercellular communication on this system is not understood. Our group has recently demonstrated synchronicity of cells over time in interactive cell populations, but not in those which are physically barred from cell-to-cell interaction. We therefore hypothesize cells can communicate circadian time to each other, resulting in synchronization of cell clock phase. To directly measure the synchronicity of cells over time we have engineered a second construct with yellow fluorescence. Venus, a yellow fluorescent protein, was introduced into the genome in codon optimized form under the control of the promoter of the *clock controlled* gene 2 using CRISPR Cas9 guided homologous recombination. When used in tandem with an existing red fluorescence construct, this new strain allows visualization and direct study of circadian synchronicity in *N. crassa* on both a single cell and on a population scale.

Religion in Fantasy: Christian and Wiccan Protagonists as Vessels for Gendered Religious Ideals

Kate Huller, CURO Research Assistant
Dr. Robert Foster, Religion, Franklin College of Arts and Sciences

Wicca is often stereotyped as promoting strong, female individuals who value their connection to the land and rebel against certain common cultural beliefs. Fundamentalist Christianity is known for its stories of men redeemed from lives of sin by their belief in God who then fulfill their male role

by becoming leaders within society. Rather than rejecting these stereotypes, certain strains of religious fantasy instead employ them by proffering the protagonists of their novels as embodiments of each religion's stereotypically gendered values. This project proposes to examine Patrick W. Carr's Christian series *The Staff and the Sword* and Anne Bishop's Wicca *Tir Alainn* trilogy as reflections of this trend within Christian Fantasy and Wiccan Fantasy, respectively. The focus will be on analyzing the way that the authors' character choices tie into the overall ideological viewpoint on the path to power presented by their respective publishing houses, Baker Publishing and Penguin House Inc. It will be further supported by the examination of texts which have been previously published by the publishing houses in order to detail trends in their publication of modern Christian and Wiccan literature. The potential effect on the readership of the publishers will also be noted, particularly emphasizing situations were religious ideas are communicated indirectly within the texts as opposed to the more obviously religious or gendered books released by the two publishing houses.

The Accuracy of SfM-Generated Dense Point Clouds Given Varying Image Quality

Nirav Ilango, Foundation Fellow, CURO Research Assistant
Dr. Marguerite Madden, Geography, Franklin College of Arts and Sciences

Structure-from-Motion (SfM) is an increasingly popular 3D modeling technique that allows images captured at different angles to be synthesized into a full 360-degree view of an object. An undergraduate-led team has been formed at the University of Georgia, with funding from the Air Force Research Laboratory, to develop a new SfM technique that uses satellite imagery to create 3D models of coastal environments. Demonstration of SfM with space imagery could lead to more accurate large-scale ecological models and could allow a researcher to avoid the large investment of time and money that characterizes UAV-generated imagery. In order to develop new SfM software that operates on a large scale, the UGA CubeSat team must understand how current SfM software adjusts to decreases in image resolution, as the images captured by the UGA satellite will have a much lower quality than typical UAV-generated imagery. This experiment studied the rate at which the density of SfM-generated point clouds decreases as image quality also decreases using standard commercial SfM software and open-source image manipulation software. By recording the number of points generated in each SfM point cloud, the researcher hoped to quantify a decrease in quality for these models. The experiment did not yield conclusive results, although it did reveal an inconsistency in SfM processing software that will need to be modified by the researchers for the satellite project.

Sensitivity of Heterotrophic Soil Respiration (HSR) to Temperature as Mediated by Mycorrhizal Fungi

Grace Anne Ingham, CURO Honors Scholar, CURO Research Assistant
Dr. Nina Wurzburger, Ecology, Odum School of Ecology

Heterotrophic soil respiration (HSR) is the largest terrestrial, non-anthropogenic source of CO_2 entering Earth's atmosphere and contributing to global climate change. HSR increases with rising temperature, and thus contributes to rising atmospheric CO_2 concentrations as part of a positive feedback loop. The degree to which HSR is heightened by rising temperatures may however be mediated by the presence of mycorrhizal fungi. Ectomycorrhizal (EM) fungi may depress HSR by limiting nitrogen availability in soils, while arbuscular mycorrhizal (AM) fungi may heighten HSR by stimulating the metabolic activities of heterotrophs as a nutrient acquisition strategy. Therefore, we hypothesize that EM fungi will dampen the response of HSR to increasing temperatures, but that AM fungi will further stimulate carbon loss. To test this hypothesis, we will sample soils from Coweeta Hydrologic Laboratory, where mycorrhizal composition ranges from completely AM to completely EM. We will incubate soils from plots along the mycorrhizal gradient at four temperature regimes (5, 15, 22, and 30°C), and measure CO_2 loss through HSR over time. We expect that HSR will increase more dramatically with increasing temperature in soils from AM dominated areas, and that the rise in HSR is muted when soils come from EM dominated areas. Our results will inform

models of carbon budgets as climate changes by illuminating the way that mycorrhizal composition of an area mediates the response of HSR to changes in temperature.

Optimization of MATLAB Code for Faster and More Consistent Image Analysis

Jawad Iqbal, CURO Research Assistant
Dr. Eric Freeman, Environmental, Civil, Agricultural, and Mechanical Engineering, College of Engineering

A Droplet Interface Bilayer (DIB for short) is a bilayer that is formed when two aqueous droplets dispersed in oil coated with lipid monolayers come in contact. Electrodes inserted within the droplets allow for characterization of the membrane properties by recording the current necessary for maintaining a prescribed transmembrane voltage. Combining these measurements with images of the droplets obtained through microscopy allows for measurements of secondary membrane properties such as thickness. My involvement was exploring how to best characterize the properties of a lipid membrane using this combination of microscopy and electrophysiology data. MATLAB is the primary tool used for DIB analysis. However, the existing code was cumbersome to use and involved many repetitive and time consuming tasks (i.e. manually changing the name of the file input for each image file to be analyzed; set of image files being 30+ images). Streamlining the process and assisting with the analysis was the primary focus of this work. Optimization of the code and process significantly reduced time on redundant tasks.

Determining the Development of the Parietal Eye in Brown Anoles

Katie Elyse Irwin, CURO Research Assistant
Dr. James D Lauderdale, Cellular Biology, Franklin College of Arts and Sciences

Circadian rhythmicity controls several physiological and behavioral responses in animals, and in people specifically, disturbances of circadian rhythms underlie mood disorders such as depression and seasonal affective disorder. The proper functioning of the circadian axis in humans and most other vertebrates is dependent on the pineal organ, a neuroendocrine gland that acts as the main synthesizer of melatonin, and the coordination of this hormone's production relies on perception of the photoperiod. However, the mechanisms governing this link between photoreception and melatonin production are not well understood. Because light is perceived in lizards through an additional parapineal structure that is not present in humans, the parietal eye, this extracranial organ offers a unique opportunity to study mechanisms of the pineal complex, as it is easily accessible and can be easily manipulated. As a first step toward better understanding these pineal processes, this project establishes *Anolis sagrei*, the brown anole lizard, as a new model organism by using a histological approach to characterize a timeline of parietal eye morphogenesis, providing a foundation for identifying molecular instrumentation mediating development. The expectation is that, because the parietal eye develops a cornea, lens, and retina similar to those of the lateral eye, the parietal eye and lateral eye will display similar molecular mechanisms of development that illuminate their relationships to the pineal gland.

The Prevalence of Science Misconceptions among the Human Body Systems: Understanding, Targeting, and Applying Misconception Findings to Effectively Teach Students about Diabetes

Stephanie Ann Jaipaul, CURO Research Assistant
Dr. Georgia W Hodges, Math and Science Education, College of Education

Research studies have repeatedly identified that students share consistent misconceptions regarding the human body systems individually and cooperatively. As part of a larger research project that addresses diabetes and obesity in humans, this literature review addresses misconceptions that students have about the musculoskeletal, cardiovascular, respiratory, endocrine, nervous, & digestive systems, which will inform the SYSTEMS team in the design of an educational game targeting diabetes and obesity learning objectives for elementary learners. This review began by identifying top misconceptions for each system separately as well as supportively, then conducting a thorough review on previous research regarding these misconceptions. Data

from the SYSTEMS project tested on students was analyzed for the misconception prevalence. The literature review and data analysis were used to prepare a full assessment on understanding, targeting, and reversing students' misconceptions of the body. I expected that I would find steady misconceptions across all grade levels, misconceptions built upon earlier misconceptions, and that misconceptions were due to a lack of science knowledge by both students and teachers along with methods of teaching that didn't incorporate misconception knowledge. The SYSTEMS project hopes to change the epidemic of obesity-related illnesses in the United States by teaching about pre-diabetic & diabetic conditions in a platform that concurrently teaches about body systems. This research is significant to the project by providing necessary resources used to understand and apply the way students think about and view the body systems, and to thus effectively teach about diabetes.

Depth Gradient Analysis of Potential *Vibrio* Pathogens in Subtropical Marine Water After the Arrival of Atmospheric Saharan Dust

Harris Jamal, CURO Research Assistant
Dr. Erin K Lipp, Environmental Health Science, College of Public Health

Every summer, Saharan dust is atmospherically transported to the waters of southeastern United States. Marine microbes, including *Vibrio*, have been shown to increase in response to the influx of iron found in desert dust, leading to blooms of potentially harmful bacteria. *Vibrio* is a genus of aquatic bacteria that can cause diseases in marine organisms and humans. The purpose of this project is to determine whether there are defined areas of enrichment of potential *Vibrio* pathogens in the water column after dust deposition. Water samples were collected from different depths at Looe Key Reef in Florida Keys, US, including the surface micro-layer (SML, top 1-1000 μm), sub-surface (~1 m below surface) and benthos (at reef depth, ~8 m). The SML is known to concentrate nutrients at the atmosphere-ocean interface, making it an important habitat for bacterial dynamics and nutrient exchange. We hypothesized that the increase in *Vibrio* population response would be greater at the SML and that the SML would be a hot-spot for potential *Vibrio* pathogens like *V. alginolyticus* that are highly responsive to Saharan dust. Species-specific PCR characterization of *Vibrio* pathogens was done on isolates collected from *Vibrio*-selective media for each depth, before, during and after a Saharan dust event in Florida. Discovery of high concentrations of *Vibrio* pathogens at the suggested depths would prove significant in that it would allow for predictive power over when and at what depth the risk of infection is higher in an effort to address increasing *Vibrio* infection rates in the US.

Mitochondrial Capacity in Young, Well-Controlled People with Type 1 Diabetes

Riley Jenkins, CURO Research Assistant
Dr. Kevin McCully, Kinesiology, College of Education

The role of mitochondrial capacity in the health consequences of type 1 diabetes (T1D) is not currently known. This study measured mitochondrial capacity of young people with T1D compared to controls. Participants with T1D (n=12) and controls (n=12) were tested for casual glucose, hemoglobin A1c (HbA1c), forearm adipose tissue thickness (ATT), and mitochondrial capacity. Mitochondrial capacity was measured in non-dominant forearm muscles using near-infrared spectroscopy as the rate constant of the rate of recovery of oxygen consumption after electrical stimulation exercise. T1D and control groups were similar in age, sex, height, weight, and race. T1D participants had a casual glucose of 133 $\pm$ 52 mg/dL, and the controls measured 93 $\pm$ 7 mg/dL, P= 0.06. HbA1c of T1D participants was 7.3 $\pm$ 0.8% versus 5.2 $\pm$ 0.4% for the controls, P<0.01. ATT was 0.6 $\pm$ 0.2cm for T1D and 0.4 $\pm$ 0.1cm for controls, P=0.03. There were no differences between groups in mitochondrial capacity (T1D= 2.0 $\pm$ 0.5min-1 and control= 1.8 $\pm$ 0.5min-1, P=0.24), or blood flow measured as the time to half magnitude of oxygen saturation (T1D= 8.8 $\pm$ 2.8s and control= 10.3 $\pm$ 3.0s, P=0.76). Young, relatively well-controlled people with T1D did not have reduced mitochondrial capacity or microvascular blood flow compared to controls. Future studies could evaluate poorly controlled or older participants with T1D to determine the effect of a longer history of T1D on mitochondrial capacity.

Bent and Broken: Debating China Beyond the Great Firewall

Amanda Molly Joffe
Dr. Rongbin Han, International Affairs, School of Public and International Affairs

The book *Bend Not Break: A Life in Two Worlds* by the Chinese-American entrepreneur Ping Fu stirred up much controversy in both China and America. In her memoir, Fu tells readers her stories, particularly her childhood experiences in the Chinese Cultural Revolution. While applauded by Western media and readers, the autobiography received polemic comments from Chinese audience. This paper explores how Chinese and non-Chinese nationals debated on this book by exploring the review/comments section on Amazon.com and other online platforms. We attempt to explain why there were such fervent and polarized outbursts, and why certain emotions are portrayed by certain nationalities. Why do Western and Chinese audiences have such polarized comments on the same book? In particular, why is there such a fervent outburst of online criticism towards Fu among Chinese in and outside China? And why do overseas Chinese that have been exposed to freer flow of information feel so strong about defending the communist China? Using the reviews on this book, our research seeks to fill the gap in the current understanding of the manifestation of Chinese cyber nationalism and how it interacts with Westerners on overseas cyberspace. We will use modern tangible examples and phenomena to gain a newer, deeper, and updated understanding.

Pressuring Playwrights: New Play Development for Contemporary Stages

Abraham Branch Johnson, CURO Research Assistant
Dr. John Patrick Bray, Theatre and Film Studies, Franklin College of Arts and Sciences

In contemporary theatre, there is an understood development process for the new script. The unprofessional reading leads to a staged reading, which leads to workshops and dramaturgy, which leads to the fluid definition of full "production." This process, however, affects the seriousness with which scripts are invested in. How do different developmental structures affect new scripts? How does producibility alter vision? I will be directly experiencing these processes in action by producing three scripts with three different intentions: a staged reading, a workshop, and a full production. I will measure dynamic pressures from writing to funding, while consulting texts and fellow playwrights in their processes. Along with this, I will keep all edits to these scripts in an effort to document changes and holistic pressures that alter and enhance my vision. This research is deeply necessary and valid in understanding the fields of professional dramaturgy, new play development, and playwriting in general. Alongside this, my work draws attention to the decline of live theatre in recent years, answering important questions like: How are theatres investing in new plays with ticket sales at risk? Where does the funding come from? Who has the most authority and how does this shape script editing? I expect to find that financing is the most tangible pressure in all of these endeavors, and that the tastes of those funding new play development have vast sway in editing new scripts for performance.

Newborn Hearing Screening and Follow-up in the Northeast Health District

Breana Johnson
MacKenzie McGraw, Anna Marie Fink, Brianna Kelley, Lauren Langan, Meredith Anne Towey, Alexis Pope, Jennifer Smith, Sherry Sayavongsa, Aleah Norton
Dr. Sandie Bass-Ringdahl, Communication Sciences and Special Education, College of Education

Newborn hearing screening is the standard of care for the early identification of infants who are deaf or hard-of-hearing. Studies investigating the outcomes of children who are deaf or hard-of-hearing continually identify early identification as a key factor in successful language development. The current project explores the state of newborn hearing screening in the Northeast Health District (encompassing Athens-Clarke County and many surrounding counties). Data obtained through the Georgia Department of Public Health for the years 2010-2016 will allow for a close investigation of the screening process including the rate of identification of hearing impairment. The data will be analyzed for demographic trends and screening

patterns with the goal of enhancing early identification and the follow-up in the District.

An Inquiry into the Role of SUT5 and SUT6 in the Release of Exudate at the Extrafloral Nectaries of *Populus tremula x alba*

Chandler Elizabeth Johnson
Dr. C. J. Tsai, Genetics, Franklin College of Arts and Sciences

The aim of this study is to evaluate the role of sucrose symporters (SUTs) in the release of extrafloral nectar (EFN) of *Populous tremula x alba*. The EFN is exuded from a small, node-like nectary gland located at the proximal end of the leaf petiole. EFN is rich in a variety of sugars, including sucrose, glucose, and fructose, as well as amino acids and various protective enzymes. EFN plays an important role in the indirect defense against insect herbivory: a mutualistic relationship is established with an EFN consumer that, in exchange, offers protection against pernicious herbivores. Previous studies have implicated a role of SUTs in regulating the release of exudate, but the exact mechanism is not very well understood. A better understanding of EFN regulation may give insight into areas as broad ranging as the evolutionary origins, food web interactions, and ecological interactions pertaining to the species in question: *Populous tremula x alba*. Over a period of nine months, the frequency and volume of exudate produced in a sample population of poplar trees, mainly SUT3-, SUT4-, or SUT5-silenced transgenic plants, and wild type, was monitored. SUT3, SUT4 and SUT5 belong to three subgroups of the SUT gene family with different functions. Results showed a marked increase in exudate production in the cool season spanning from November to February, whereas EFN production was poor during the warm season from June to October. In order to gain insight into the regulation of SUTs, in situ hybridization is undertaken. In this process, gene-specific, DIG labeled probes are prepared using in vitro transcription. Chemical analysis of exudate composition by means of gas chromatography, and signal detection via in situ hybridization are ongoing.

Fostering Productive Beliefs about Failure and Intelligence to Improve Learning in STEM

Elizabeth Cara Johnson, CURO Research Assistant
Dr. Logan Fiorella, Educational Psychology and Institutional Technology, College of Education

The demand for workers in STEM fields is increasing, yet the number of students choosing to pursue STEM educational and occupational goals does not match this demand. Women and minorities are especially underrepresented in STEM fields. Contributing to this misrepresentation and demand are unproductive beliefs that students hold about learning in STEM subjects. For example, many students believe that success is based on innate ability and that struggle and failure are signs of one's lack of ability. By challenging these notions of intelligence and success, we hope to improve student motivation and academic performance. Using story-based intervention, the current study asked 51 sixth-graders to read a story about a successful scientist that either emphasized her struggles and persistence in the face of challenges (struggle group), or that emphasized the role of her innate talent and ability (control group.) Students were assessed on beliefs and math ability before and after reading one of the two stories. We anticipate that participants assigned to the struggle condition will have improved beliefs and performance on math tests due to reading the story about struggle and overcoming challenges. Using stories as a method of instruction may be a promising tool for shaping student's beliefs about intelligence and failure. This may help more students persist in the face of challenges, ultimately expanding students' opportunities for success in STEM careers.

How Do Parental Practices Influence Adolescent Food Choices?

Evan Simone Johnson, CURO Research Assistant
Dr. Alex Kojo Anderson, Foods and Nutrition, College of Family and Consumer Sciences

We studied parental habits such as modeling, home food environment, and rules that impact eating behaviors during independent eating occasions among low-income, multi-ethnic adolescents between the ages of 10 and 13 years.

Family food practices are an influential component of developing lifelong healthy eating habits, and understanding which practices are most impactful among adolescents could help health practitioners better counsel their patients. This was a mixed-method design with parent-child pairs in the Athens area involving 2 study visits. On the first visit, the parent and child were interviewed, and the child was provided guidance to take photos of everything consumed in a chosen 24-hour period to send to the research team. On the second visit, adolescents were asked about independent eating environment, food choices and the role of their parents and peers in food selection. Parents were also asked about how they instill healthy eating habits in their household. Both completed a survey at the end of the interview. The interviews were transcribed verbatim and analyzed for themes. Anthropometric measurements of weight, height and waist circumference were conducted on both the parent and adolescent. Findings suggest that adolescents adapt similar food habits as their parents. They also lean towards ready-made, easily accessible foods that can be prepared without much supervision. To control eating habits, parents often utilize bargaining or do not purchase foods that they do not want their child to eat. Most parents wished their child would consume more fruits and vegetables. The findings have the potential to shape nutrition education targeting parents and adolescents.

Metacognitive Regulation in Undergraduate Biology Students

Me'Shae Johnson, CURO Research Assistant
Dr. Julie Dangremond Stanton, Cellular Biology, Franklin College of Arts and Sciences

Metacognition is what we know about our thinking and how we are able to regulate our thinking in order to facilitate our own learning. Metacognition positively correlates with learning outcomes, academic performance, and problem solving. This project centers on understanding metacognitive development among undergraduate students so that we can develop effective ways to stimulate metacognition. The long-term goal of this research is to use metacognition to enhance student learning in undergraduate biology courses. Our research question is: how does the use of the metacognitive skills (planning, monitoring, and evaluating) compare between first- and fourth-year undergraduate students? We will compare data from introductory biology students with data from upper-level biology students to see how metacognitive regulation might progress over time. We will collect data using two open-ended assignments given after the first and second exam in an introductory biology course and a senior-level cell biology course. We will use qualitative methods such as content analysis to find evidence of students' use of metacognitive skills. This analysis will allow us to identify those students who effectively use metacognition and those who are working to adjust their learning strategies. Our findings will be used to design research-based curriculum for improving student metacognition.

Mothers' Childhood Emotional Neglect as a Predictor of Child Behavior Problems

Sara Carroll Johnson
Amber Madden
Dr. Anne Shaffer, Psychology, Franklin College of Arts and Sciences

Childhood emotional neglect (CEN) is a specific form of child maltreatment in which caregivers fail to make a significant emotional connection with their child, thereby preventing the development of healthy attachment bonds. Individuals who have been emotionally neglected in childhood are more likely to experience later psychological distress when compared to those who were emotionally neglected by male caregivers. Mothers' experience of CEN has also been shown to be predictive of poor parenting outcomes, but less research has examined relations between maternal CEN and their children's behavior. Maternal emotion dysregulation, or difficulties in modulating emotional responses, is of particular concern since emotion dysregulation is a significant mediator of the relationship between childhood maltreatment and parenting stress. Based on these relations, we hypothesized that emotion dysregulation would mediate the relations between maternal CEN and the occurrence of internalizing and externalizing behaviors in their children. This study utilized data collected from a sample of 58 mothers and their children aged 8-11. Measures included a measure of maternal childhood emotional neglect (CTQ), emotion dysregulation (DERS), and mothers' reports of child behavior problems (CBCL). A multiple mediation model considered all of the

DERS subscales simultaneously as potential mediators. Results indicated that low emotional clarity, a component of emotion dysregulation, was a significant mediator of the relations between maternal childhood emotional neglect and the occurrence of behavior problems in their children (indirect effect=.17, SE=.11, 95% CI=0.2-.46). Future research might further examine the relationship between emotion dysregulation and other parenting behaviors that may predict child outcomes.

Household Production of Health: Cambodian Refugees' Health Strategies in the United States

Abby Carden Jones, CURO Research Assistant
Dr. Denise Clark Lewis, Child and Family Development, College of Family and Consumer Sciences

A life course theoretical perspective and multidisciplinary Household Production of Health (HHPH) conceptual model illustrate Cambodian refugee families' processes for acquiring and maintaining health. Life course perspective provides a dynamic view of refugees' pathways from fleeing their home nation to resettlement in the United States. Social ties, family relations, traditions, and immigration stressors contribute to refugees' experiences and influence culturally relevant health production. The HHPH model used in our analysis of 125 Cambodian refugees' narratives gathered during ethnographic research conducted between 1997 and 2014, includes multiple factors that influence refugees' ability to acquire and maintain well-being in the US. The HHPH conceptual model takes into account multiple elements associated with beliefs and behaviors surrounding decisions about the desire for culturally responsive health services. Life course perspective and the HHPH conceptual model combine to reveal how refugees' transition to the host country influences health trajectories, the significance of linkages between individuals, families and communities, and how historical context informs individual and collective actions. Ultimately each element shown in the HHPH model affects what is viewed as a culturally relevant health service, how refugees attain such service, and which services are suspect and not viewed as culturally responsive. The HHPH conceptual model is based on interviews and interactions with Cambodian refugees; however, the HHPH model can be applied across other refugee groups to understand transitions associated with their household projection of health. It can be used to inform US policy makers and service providers of culturally specific needs of refugee families.

The Suburbanization of Poverty in Metro Atlanta

Phillip Jones, CURO Research Assistant
Dr. Laura Zimmermann, Economics, Terry College of Business

Over the last decade, there has been a substantial increase in poverty rates in suburban counties surrounding cities across the country. The metro Atlanta region, with exponential growth in size and population in recent decades, has exhibited this same suburbanization of poverty. The dominant perception is often that poverty remains a uniquely urban problem, and therefore the problem of suburban poverty is often left unaddressed. Recently, the city of Atlanta has refocused on creating sustainable mixed income communities that will serve all Atlanta residents, regardless of socioeconomic status. An example if this is the developing Atlanta Beltline Project. However, the question remains of whether public services, including convenient public transit, affordable housing, sustainable economic opportunities, and other resources are being developed and readjusted to account for metro Atlanta's rise in suburban poverty. Research has suggested that the current public policy and nonprofit framework concerning poverty is too urban-oriented and therefore ill-equipped to deal with the new challenges of today's suburban poverty situation. This research project will begin by quantifying the change in poverty rates in nineteen metro Atlanta counties since the year 2000. Next, it will review literature and other resources that may help explain why there has been an increase in poverty in these counties. Lastly, this project will suggest actions that should be taken by the private, public, and nonprofit sectors in order to spur economic growth and opportunity for Atlanta's suburban poor.

PCR Detection of the SRY Gene of Male Dog Mesenchymal Stem Cells in Female

Dog Brains with Experimentally Induced Ischemic Stroke

Susie Jones, Foundation Fellow
Dr. Buffy Howerth, Pathology, College of Veterinary Medicine

Intra-carotid-delivered mesenchymal stem cells (MSCs) may improve functional neurological outcomes after acute ischemic stroke (AIS). However, a large animal model is essential before beginning human clinical trials for patients with AIS. This study uses a dog stroke model in which female dogs with experimentally induced AIS receive male-derived MSCs via intra-carotid injection. It is hypothesized that the MSCs will successfully move to the site of infarction and participate in repair of damaged tissue. The objective of the present study is to target the Y chromosome in order to track the migration of the male-dog derived MSCs to various locations by using PCR. To detect the MSCs, two techniques were developed or modified from those in the literature to amplify the SRY gene on the Y chromosome. A previously described PCR technique and an original quantitative PCR technique were then tested using fresh brain samples from female dogs with experimentally induced AIS that were subsequently injected with male MSCs on the side of the stroke. Both techniques were able to detect the Y chromosome in the brain samples and are suitable for tracking male-derived MSCs in this dog model of stroke. These techniques may have future applications in determining the sex of canine subjects in forensic cases.

Evaluation of Middle-Miocene Barnacles as High-Resolution Paleoclimate Proxies

Reid Jordan, CURO Research Assistant
Dr. Sally Walker, Geology, Franklin College of Arts and Sciences

The Miocene Epoch stands in stark contrast with the global climate trends of the Cenozoic Era. The Middle Miocene Climatic Optimum (MMCO) disrupted a ~50-million-year cooling trend with three million years of relative warmth. Characterizing the MMCO were elevated sea levels, increased global temperatures and oceanic stagnation. Increased scientific understanding of the MMCO will allow for parallels to be drawn between modern global climate change phenomena and past climate and oceanic conditions. Relatively little data exists for Middle-Miocene oceanic seasonality in the Atlantic Margin. For my research, the barnacle, *Balanus concavus*, of the Maryland Middle Miocene, is evaluated for suitability as a high-resolution paleoclimate proxy. These large Maryland fossil barnacles are suspected to have grown year-round while sequestering carbon and oxygen isotopes near equilibrium oceanic values. As these barnacles age, calcium carbonate is secreted via cuticle -like tissues along the base of the external shell. This process is nearly continuous excepting interruption from breeding or molting events and brief cessations due to lack of nutrients. These events result in distinct growth lines and molting ridges within the external parietal plates and results in a subannual to multiannual record of oceanographic conditions during the time the barnacle was living. This study involves gathering transects from the oldest to the youngest shell of *Balanus concavus* for stable oxygen isotopic analysis. We anticipate oxygen isotope data to reveal either oceanic seasonality within the MMCO or little seasonality if the waters were warm year round.

Mapping Near Misses in Athens-Clarke County

Stephen Benjamin Jordan, CURO Research Assistant
Dr. Jerry Shannon, Geography, Franklin College of Arts and Sciences

The Bike Master Plan (BMP) is a developing road biking plan for the use and implementation by the Athens Clarke County Planning Commission. A major point of interest and concern is a comprehensive source of spatial recognition of near misses of bike riders in Athens-Clarke County (ACC). In order to correctly gauge the intended spatial analysis, this research endeavor will take part with a series of interviews of persons who regularly ride for various reasons, such as work, exercise, and/or environmental concerns. Interviews will consist of both qualitative and quantitative data questions regarding each individual's experience bike riding in ACC. Moreover, a sketch map will be drawn by interviewees of their routes taken and information along with that. Methodologies include, but are not limited to, interview analyses, digitization of

routes drawn and discussed by interviewees, geospatial integrated tools to find, spatial clusters and heat indexed routes, and comparative data analysis which will aid in the pursuit to provide the BMP with a comprehensive idea of target areas to address in order to improve bike riding conditions. The latter portion explains a part of the significance from which this research will provide; furthermore this data will provide the ACC Planning Commission a valuable source of information pertaining to future development projects that will ensure the safety of both bike riders and drivers on ACC roadways.

Attachment Orientation and Career Goal Pursuit: The Effects of Relationship Commitment and Workaholism

Amita Joshua, CURO Research Assistant
Dr. Malissa Clark, Psychology, Franklin College of Arts and Sciences

The goal of this study is to examine the relationship between attachment orientation and career goal pursuit and the moderating effects of relationship commitment and workaholism. Specifically, we seek to understand whether attachment at infancy can affect goal pursuit in adulthood, which is defined as the active pursuit of career-related goals through spending time dedicated to goals and accomplishing measurable achievements. In attachment theory, anxious attachment refers to an obsessive approach to relationships that is associated with low self-esteem and fear. Avoidant attachment is associated with maintaining security by avoiding intimacy in social and romantic relationships. Attachment is more often studied in infants; however, recent studies have found the effects of attachment orientation carry past infancy and further into development. The following hypotheses will be tested: 1) Whether higher avoidant attachment predicts higher career goal pursuit, 2) Whether higher anxious attachment predicts lower career goal pursuit, 3) Whether relationship commitment moderates these relations and 4) Whether workaholism moderates these relationships. Nearly 400 participants will be recruited from Amazon Mechanical Turk. Participants will be asked to complete the Experiences in Close Relationships-Revised Questionnaire, the Tenacious Goal Pursuit scale, the Commitment Inventory and the Work Addiction Risk Test. Multiple regression analyses will be used to test these hypotheses. The findings from this study will help to elucidate the role of developmental psychology within the field of industrial-organizational psychology.

Depression and Risky Health Behaviors: The Moderating Effect of Coping Responses

Amita Joshua, CURO Research Assistant
Dr. Anne Shaffer, Psychology, Franklin College of Arts and Sciences

The goal of this study is to examine the relations between depression and risky behaviors and the moderating the effect of coping responses in college students. This research has important treatment implications for young adults experiencing depressive symptoms. This study examined risky behaviors including tobacco use, drug and alcohol use, risky sexual behaviors and safety-related behaviors. The following hypotheses were tested: 1) Whether higher levels of depressive symptoms predict higher levels of risky behaviors and 2) Whether positive coping responses moderate (i.e., buffer) these relations. Data was collected from 1561 participants from an undergraduate research pool. Participants completed the Center for Epidemiological Studies Depression Scale, the Youth Risk Behavior Survey and the BRIEF Cope Inventory. Bivariate correlations revealed that depressive symptoms were significantly correlated with risky behaviors ($r=.16$, $p<.01$). Additional regression analyses were performed to determine whether coping responses moderated the relations between depressive symptoms and risky behaviors. Results indicated that coping responses significantly buffered the relations between depressive symptoms and risky behaviors ($R^2=.03$, $F(3,1614) =11.70$, $p <.01$). Specifically, students who reported high usage of positive coping responses engaged in fewer risky behaviors ($\beta=.30$, $p<.01$). These findings highlight the importance of developing individual's adaptive coping responses in clinical applications. Given that this study was limited to college students, future studies should consider whether these findings generalize to other populations such as early adolescents and non-college samples, as well as consider analyzing the effects of depressive symptoms and coping

responses on specific categories of risky behaviors.

Turbulence at the Edges of Diffuse Molecular Clouds

Mackenzie Joy, Foundation Fellow
Dr. Loris Magnani, Physics and Astronomy, Franklin College of Arts and Sciences

Diffuse molecular clouds can be observed with carbon monoxide (CO) spectra obtained from radio spectroscopy. Though the clouds are mostly composed of molecular hydrogen, they are much more difficult to detect from ground-based telescopes, so the known correlation between the presence of CO and molecular hydrogen is utilized in the detection of clouds. This research seeks to better understand the behavior at the edges of diffuse molecular clouds. Because of the interactions between the molecular gas at the edge of the cloud and the surrounding atomic medium, one would expect the clouds' edges to be more turbulent than the insides of the cloud. Turbulence can be measured via the width of the CO spectral lines with broader lines indicating more turbulent clouds. Recent observations, however, have shown narrow spectral lines associated with CO at the edges of diffuse molecular clouds, contradicting the previous assumption. This research will compare the width of CO spectral lines with the area under the best-fit Gaussian curve, a measure of line strength, in order to determine the nature of the relationship between the edges of clouds and their surroundings. These relationships will be determined by compiling data from spectra detecting the 1-0 rotational transition of CO and graphing the line width versus the line strength. The results of this study will have consequences for understanding the behavior of molecular gas at the atomic/molecular interface and the nature of diffuse molecular clouds in general.

Examining the Entropic: Locating Modernity in the Writings of Jane Austen

Jianna Justice
Dr. Roxanne Eberle, English, Franklin College of Arts and Sciences

Jane Austen, often cast by critics as a conservative spinster writing novels of niceties stained with the scent of afternoon tea and crumpets, is rarely heralded for her radicalism or innovative experimentation. My paper addresses how we can locate Austen in her writings as a progressive author, incredibly intrigued with the prospect of radical modernity. I argue that Austen appears consciously caught at a point of dialectical antithesis between competing pressures of residual Georgian tradition, and pulsing modernity fueled by the mechanization of 19th century England. The crux of my justification hinges on textual evidence of the entropic, or the inclination towards chaos and disorder, as a peculiarly modern symptom. In tracing elements of the entropic throughout Austen's texts, I ultimately locate two salient phenomena, one phenomenological and one philological, that mark a pivotal shift towards the modern. The first, concerns a contextual renegotiation of masculinity; the grizzled, decorated war hero is favored over the passive, leisured gentleman. The landed gentry's way of life is ultimately revealed as outmoded and unsustainable in the changing climate. The second offers a formal dissection of the em-dash as a peculiarly entropic mark, insofar as it allows for increased disorder and a novel assemblage of disparate ideas within the confines of the sentence. In examining Austen's approach to the modern, specifically her promotion of agility in syntax and subject, I hope to express her attraction to both the precariousness and intensive possibility held in the notion of the new.

Significance of MARCO in *Mycobacterium tuberculosis* Resistance

Mevelyn Kaalla, CURO Research Assistant
Dr. Kaori Sakamoto, Pathology, College of Veterinary Medicine

A macrophage scavenger receptor, Macrophage Receptor with Collagenous Structure (MARCO), has been previously shown by the Sakamoto lab to be important in binding to a virulence factor, trehalose 6,6'-dimycolate (TDM), in the cell wall of *Mycobacterium tuberculosis* (*Mtb*), the causative agent of tuberculosis (TB). A single nucleotide polymorphism in the MARCO gene, rSNP, has been identified to be associated with resistance to TB. The rSNP is thought to introduce a DNA-binding site for the transcription factor, C/EBP (CAAT-enhancer binding protein). To test this hypothesis, biotinylated wildtype MARCO

(MARCO-WT) and rSNP MARCO (MARCO-R) probes were incubated with nuclear extract, applied to a neutravidin resin column, then eluted and subjected to gel electrophoresis. They were then transferred to a nitrocellulose membrane and probed for two forms of C/EBP, C/EBPα and C/EBPβ. Both forms demonstrated enhanced binding to the MARCO-R probe relative to the MARCO-WT probe. Next, a luciferase reporter assay was performed to examine transcriptional activity of MARCO-WT and MARCO-R in macrophages, revealing reduced transcription attributed to MARCO-R. Therefore, enhanced binding of C/EBP downregulates transcription of MARCO, as seen with the rSNP. By downregulating MARCO, the rSNP may allow for less MARCO-TDM interaction, which may be involved in arresting phagosomal-lysosomal fusion. Individuals with the rSNP would therefore exhibit increased control over the *Mtb* infection. This project studies the mechanism whereby the rSNP mediates resistance. Examining MARCO expression and interactions with TDM and *Mtb* infection will result in a better understanding of the role and mechanism of action of MARCO in TB pathogenesis.

Identification of MAb109 Epitope in Pancreatic Cancer Cells

Manasa Kadiyala, Ramsey Scholar, CURO Summer Fellow
Dr. Hawkeye Pierce, Biochemistry and Molecular Biology, Franklin College of Arts and Sciences

Pancreatic adenocarcinoma (PDAC) is a lethal cancer with annual survival rates less than 25%. It currently lacks proper diagnosis and treatment, which leads to many patients being treated and screened after malignant tumorigenesis has already occurred. The progression of oncogenesis and tumor growth has been found to be linked to changes in glycan expression on the cell surface of pancreatic cells. These abnormal modifications can be specifically targeted, and their identification can serve as a potential therapeutic for the disease. Glycans and glycoproteins are useful objects of study as they are uniquely affected by changes in glycosylation that occur early on in oncogenesis. In order to identify the specific glycan target for pancreatic adenocarcinoma, researchers have identified a mouse monoclonal immunoglobin G (IgG) antibody (MAb109) that uniquely reacts with PDAC tissue but not normal, uninfected pancreatic tissue. The place where this antibody binds, its epitope, is N-glycan specific and is present on certain glycoproteins, one of which is CEACAM6 (Carcinoembryonic Antigen Related Cell Adhesion Molecule 6) in PDAC tissue. Identification of this MAb109 epitope using site-directed mutagenesis of N-glycosylation sites and truncation of CEACAM6 fragment 1 (C6f1) can set the stage for development of unique clinical screening and therapeutic tools and eventual treatment of pancreatic cancer.

How Does FoodCorps Contribute to the Pursuit of Farm to School Success?

Usha M Kaila
Dr. Jennifer Jo Thompson, Crop and Soil Sciences, College of Agricultural and Environmental Sciences

This project examines the impact of FoodCorps service members on the success of Farm to School programs in Georgia. Farm to School programs, which aims to bring healthy, locally grown foods, education about nutrition and agriculture, and school gardens to K-12 schools, are estimated to be in 42% of schools in the US. Nevertheless, Farm to School programs face a number of challenges, including cost and institutional support. FoodCorps is an Americorps service organization that aims to teach children about food and nutrition through hands-on experiences such as school gardens and culinary instruction. Since 2014, Georgia Organics has hosted FoodCorps service members placed in several school districts across the state. As part of an evaluation of Georgia Organics' farm to school programming, we conducted semi-structured interviews with FoodCorps members, their site supervisors, and school nutrition directors in their districts. We examine the data to determine how the presence of FoodCorps service members impacts student engagement and staff buy-in of Farm to School.

Characterizing the Ribonuclease Activity of *Staphylococcus epidermidis* Csm6

Joshua A Kalter, CURO Research Assistant
Dr. Michael Terns, Biochemistry and Molecular Biology, Franklin College of Arts and Sciences

CRISPR-Cas systems are adaptive immune responses that have emerged as powerful genomic editing tools to provide defense against foreign nucleic acids in prokaryotes. CRISPR-Cas systems have been categorized into several diverse groups but all function through specific interactions between a short RNA (crRNA) and CRISPR-associated (Cas) proteins. crRNA molecules provide specificity by base-pairing with foreign DNA and RNA molecules. Typically, several Cas proteins with varying structural and nuclease functions combine with the crRNA to form a CRISPR ribonucleoprotein complex, termed crRNP. In Type III-A (Csm) invader silencing, the crRNP contains five proteins (Csm1-5) with varying roles. Though it is not a member of the crRNP, invader silencing requires the presence and activity of an additional protein known as Csm6. Biochemical and structural data confirm the absence of Csm6 within the crRNP. Thus, understanding the contribution of Csm6 remains a major question. Studies have demonstrated that Csm6 is a single-stranded RNA-specific endoribonuclease that is necessary for anti-plasmid CRISPR-Cas immunity. We sought to characterize the ribonuclease activity of recombinant *Staphylococcus epidermidis* Csm6 in vitro, as well as to determine the presence of target specificity for this activity. We demonstrate that an introduced catalytic-site mutation results in diminished ribonuclease activity. We also demonstrate that *S. epidermidis* Csm6 degrades single-stranded RNA with a preference for purines. Not only is our work fundamentally important in determining the greater role of Csm6 in DNA targeting, but it will also lay the groundwork for the development of RNA-editing tools from the Type III-A CRISPR-Cas system.

The Effects of Two Different High-Fat Diets on Appetite Hormone Levels

Fatima Kamal, CURO Research Assistant
Dr. Jamie A Cooper, Foods and Nutrition, College of Family and Consumer Sciences

Eating a single meal rich in poly-unsaturated fats (PUFAs) results in greater suppression of the hunger hormone, ghrelin, and higher levels of the satiety hormone, PYY, vs. a meal rich in mono-unsaturated fats (MUFAs). We aim to determine the effect of a high-fat diet rich in MUFAs or PUFAs on ghrelin and PYY levels. Randomized, cross-over trails consisted of 2 trails that were each 10 days. Twelve adult males (ages 18-45) were recruited. Each 10 day trial consisted of a 3 day lead-in diet, two 9 hour testing visits (pre- and post-diet), and a 5 day intervention diet. During the 5 day diet, subjects received meals enriched with either cottonseed oil (high in PUFA) or olive oil (high in MUFA). The diets were 50% fat, 35% carbohydrates, and 15% protein. During each 9 hour testing visit, subjects received a breakfast and lunch meal, high in the fat designated for that trial. Blood was drawn every 30 minutes for 9 hours to measure appetite hormones. There was no difference in fasting ghrelin or PYY from pre to post diet in either PUFA or MUFA. Postprandial area under the curve was not different from pre- to post-diet for ghrelin in MUFA (pre: 518.6±145.8pg/ml, post: 505.3±182.7 pg/ml, p=0.7) or PUFA (pre: 499.3±113.0pg/ml, post: 541.6.±189.2pg/ml, p= 0.2). PYY was not different from pre- to post-diet in MUFA (pre: 1136.8±263.2pg/ml, post: 1085.0±208.0pg/ml, p=0.2) or PUFA (pre: 1064.4±197.0pg/ml, post: 1006.0±185.7pg/ml, p= 0.2). High fat diets rich in either MUFA or PUFA did not lead to changes ghrelin or PYY.

Are *Wolbachia* Co-Obligate Nutritional Symbionts in the Banana Aphid *Pentalonia*?

Bryan Kamalaker, CURO Research Assistant
Dr. Kerry Oliver, Entomology, College of Agricultural and Environmental Sciences

Many eukaryotes acquired ancient infections with microbial symbionts that allowed expansion onto novel feeding substrates. For example, the bacterium *Buchnera* colonized aphids 150 mya, and by providing essential nutrients, allowed aphids to exploit plant phloem resulting in more than 4500 extant aphid species. However, over time aphids and *Buchnera* became co-dependent resulting in major vulnerabilities to the partnership. The strict intracellular life and trans-generational bottlenecks of *Buchnera* resulted in small effective population sizes, which through relaxed selection have led to genome reduction and symbiont decay. Several processes potentially compensate for *Buchnera* decay. For instance, in a few aphid species, *Buchnera* has been replaced by other symbionts, while in other aphids, a normally facultative symbiont species, has joined the nutritional

partnership and become a co-obligate symbiont. Recently, a study suggested that *Wolbachia*, a ubiquitous heritable symbiont of arthropods, was a co-obligate symbiont in the banana aphid *Pentalonia*. In a small sample the authors found that all individual aphids were infected – a requirement for obligate status and unusual for *Wolbachia*, and that *Buchnera* had lost the ability to make Riboflavin while *Wolbachia* retained the missing components RibD and RibH. However, we screened diverse *Pentalonia* populations across the Pacific and found *Wolbachia* was not fixed (83% infected). Given its facultative status, we are conducted several assays reconsidering whether *Wolbachia* is genuinely a co-obligate partner. Early results indicate that in our non-fixed populations, *Buchnera* has indeed lost RibD & RibH, while *Wolbachia* retains them, which suggests that other compensatory mechanisms are operating.

Altered Neural Activity in the MCLS and NA linked to Alcohol Consumption

Aparna Kanjhlia, CURO Research Assistant
Dr. Lawrence Sweet, Psychology, Franklin College of Arts and Sciences

Alcohol use among adolescents and young adults has a significant impact on public health in the United States. Impulsivity has been linked with vulnerability to alcohol use and altered connectivity of the neural reward system. Several brain areas, such as the mesocorticolimbic reward system (MCLS) and nucleus accumbens (NA) have been associated with impulsive decision making. The present study aims to investigate whether neural activity in the MCLS and NA at rest is associated with risky alcohol related decisions through an analysis of functional connectivity. Nine healthy young adult participants from the rural southern United States participated in a functional MRI resting state scan using a 3T scanner as a part of a larger study conducted by the UGA Clinical Neuroscience (CNS) Laboratory. Alcohol use and associated behaviors were measured using the Alcohol Use Disorder Identification Test (AUDIT). Impulsivity was measured using the Monetary Choice Task (MCQ), a measure of delay discounting. Neuroimaging analyses will be conducted using Analysis of Functional Neuroimaging (AFNI) software and correlation and regression analyses will be conducted in SPSS. It is hypothesized that individuals with decreased connectivity of the MCLS and NA will report consuming alcohol at a higher frequency than those with higher connectivity. These findings may contribute to and extend the understanding of the link between alcohol and impulsivity in a yet unstudied population of emerging adults from rural communities.

Microaggression in the Eye of the Beholder: Perceiver Characteristics in the Detection of Microaggressions in the Workplace

Soundarya Kanthimathinathan, CURO Research Assistant
Dr. Brian Hoffman, Psychology, Franklin College of Arts and Sciences

Microaggressions are typically conceptualized as subjective and perceptual phenomena, defined as subtle verbal or behavioral discrimination based on the receiver's personal identity. Although much research has examined the impact of microaggressions on important work outcomes, scant attention has been paid to the characteristics of the perceiver of macroaggressions. To the extent microaggressions are believed to be subjective and perceptual phenomena, this study proposes that characteristics of the perceiver influence the likelihood that microaggressions will be perceived, specifically the perception of microaggressions by minority employees. Using Amazon's Mechanical Turk, data will be collected on the perceptions of microaggressions by minority employees working full time. Individual characteristics of the perceiver including personality, group identity, and familiarity with the microaggression paradigm will be examined as predictors of the perception of microaggressions. The association between perceiver characteristics and perceptions of microaggressions will be examined to shed light on the factors that contribute to the study of microaggressions. These findings will have important implications for the on-going debate as to how to address a subjective phenomenon such as microaggressions and thus, will provide insight for organizations seeking to reduce the harmful influence of microaggressions on employee outcomes through interventions or training.

Isolation of VAR2CSA DBL3x Binding Domains for Protein Expression

Rahul Katkar, CURO Research Assistant
Dr. David Peterson, Infectious Diseases, College of Veterinary Medicine

Placental malaria is contracted by pregnant mothers and latch onto the placenta, restricting nutrient delivery to the fetus causing premature birth and low birth weights. Whilst multigravid women develop immunity to Plasmodium falciparum, it seems that primigravid and secundigravid women struggle to combat the parasite. The parasite's genome has a semi-conserved var2csa gene which contains DBL domains which allow the protein to bind to chondroitin sulfate A receptors on the placenta, causing an accumulation of red blood cells thus disrupting the placental blood flow. Immune women have antibodies that restrict VAR2CSA, therefore it is hypothesized that the VAR2CSA found in immune women bind less well than VAR2CSA found in non-immune women. To study the binding domains encoded in the var2csa gene, the relevant regions of the gene must first be cloned. The cloning protocol uses vector plasmids, restriction enzymes and ligation to create plasmid constructs that are transfected into *E. coli* cells that clone enough of the gene to be sequenced and sent to be translated in wheat germ cell free protein synthesis. This protein synthesis technique was chosen for its high yield and quality of translated proteins. EBA-175 is a protein akin to VAR2CSA but is not involved in binding affinity to CSA, therefore is an excellent choice for a negative control. The proteins that are translated from these cloned genes can then be tested in binding affinity to CSA receptors, thus aiding in a possible vaccination development.

The Evolution of Religion in Africa: A Test of the Big God Hypothesis

Samantha Keating
Dr. Bram Tucker, Anthropology, Franklin College of Arts and Sciences

While throughout most of human history, people have lived in small-scale, hunter-gatherer societies, most people today live in large-scale, anonymous societies. Understanding why people cooperate in these large societies is a mystery that social scientists have attempted to solve. Psychologist Ara Norenzayan developed a cultural evolutionary hypothesis to explain this phenomenon, which states that the belief in moralizing high gods explains why people cooperate in large, anonymous societies. Therefore, the belief in moralizing high gods can universally be attributed to large-scale societies. However, this hypothesis is fundamentally flawed as it fails to take into account the diversity of humanity, and is therefore subject to testing. In order to test Norenzayan's hypothesis, data was collected on 11 African societies' sociopolitical structures and religious cosmologies, and statistical analysis was conducted on data from Murdock's Ethnographic Atlas on a global scale. Results show that Norenzayan's hypothesis is too simplistic and fails to account for human diversity. Of the sampled societies, belief in a moralizing high god was present in several small-scale, hunter-gatherer societies, while absent in some large-scale societies, thus falsifying the universality of Norenzayan's hypothesis. Due to the prevalence of claims of universal human nature in popular media, testing these widespread claims is critical as they perpetuate myths of human nature that are often untrue.

Environmental Consequences, Psychological Comorbidities, and Tic Symptom Severity in Children with Tourette Syndrome

Colleen Keeler, CURO Summer Fellow, CURO Research Assistant
Dr. Ronald L Blount, Psychology, Franklin College of Arts and Sciences

The present study evaluates the relationship between environmental factors (e.g., reactions to displaying tic symptoms [accommodation], family socioeconomic status [SES; as measured by parent income and education level]), tic symptom severity, and psychological comorbidities in children (aged 9-17 years) with Tourette syndrome (TS; n = 48). Caregivers (n = 48) reported on their children by completing the Tic Symptom Parent Report, Tic Accommodations and Reactions Scale, Behavioral Assessment System for Children – 2nd Edition, and Spence Child Anxiety Scale. Bivariate correlations were conducted to examine relationships between family SES, parent's accommodation behaviors for tics, tic symptom

severity, and comorbid psychological symptoms. Both family income level and parental education level were negatively correlated with children's social phobia symptoms. Separation anxiety was positively correlated with all other measured comorbidities. Children with TS whose parents reported higher accommodation of tic symptoms had higher parent-reported levels of separation anxiety, OCD, and hyperactivity than children of parents who reported less accommodation. Parents who reported higher accommodation of tic symptoms reported more severe tic symptoms than the children of parents who reported less accommodation. Findings indicate that parents of children with TS may benefit from behavioral interventions aimed at improving their responses to their child's tic symptoms, and that children with TS may benefit from family-focused interventions to increase positive coping strategies. Additionally, determining what factors associated with low SES that lead to the correlation between SES and symptom severity could help parents identify how they can alter their lifestyle in order to prevent the worsening of tic symptoms.

Functional Evaluation of Porcine Kidney: A Thorough PSF Organ Storage Study

Hannah Kemelmakher, CURO Research Assistant
Dr. John Peroni, Large Animal Medicine and Surgery, College of Veterinary Medicine

Organ persufflation (PSF), or gaseous oxygen perfusion is used to preserve organs outside of the body and has been studied in various tissues. Compared to the more universally accessible hypothermic storage method called Static Cold Storage (SCS), persufflation requires more characterization before it can be more widely accepted in the world of organ transplantation. There is promising evidence that PSF significantly improves tissue viability and survival rates of transplanted organs. Our goal is to compare the static cold storage method to organ persufflation in the kidney which is the most commonly transplanted organ. Our hypothesis is that persufflation will result in improved tissue viability than cold storage by preserving vascular and mitochondrial functions. We plan to harvest kidneys from pigs immediately after slaughter and preserving each for 24 hours with either PSF or SCS. Subsequently, renal parenchyma will be obtained to assess oxygen consumption rate, mitochondrial enzyme activity, endothelial dysfunction, spontaneous arterial tone development, and the presence of oxidative damage. To determine vascular function, renal vessels will be isolated while in a physiological salt solution using dissection microscopy. Their contractile function will then be measured using a small vessel wire myograph in a controlled temperature environment. We anticipate that organ persufflation will result in superior tissue respiration values and vascular contractility as assessed through measurements of mitochondrial and arterio-venous functions. This series of experiments will significantly impact the knowledge available regarding the effects of tissue persufflation of kidneys and may have a significant impact on the field of organ transplantation.

Electroformation of Giant Unilamellar Vesicles

Melanie Kemp, CURO Research Assistant
Dr. Eric Freeman, Environmental, Civil, Agricultural, and Mechanical Engineering, College of Engineering

The intent of this research is to develop a protocol for the creation of "empty" model cells known as giant unilamellar vesicles (GUVs). GUVs are typically composed of an aqueous fluid encapsulated by a bare or unmodified lipid membrane. The content of the lipid membrane can be modified to measure the link between the membrane composition and its mechanical properties, such as the bending modulus and surface tension. The GUVs also allow for the observation of the membrane responses to environmental stresses, including varying osmotic pressures. For the purpose of this experiment, Diphytanoyl phosphatidylcholine (DPhPC), 1,2-Dioleoyl-*sn*-glycero-3-phosphocholine (DOPC), and asolectin (soybean) lipids were dissolved in chloroform and evaporated with nitrogen within a polydimethylsiloxane (PDMS) well secured on an indium-tin-oxide (ITO) slide. The evaporated lipids were then diluted in various concentrations of sucrose and underwent electroformation with varying voltages, frequencies, and times. It was determined that DPhPC diluted in 20 mM of sucrose under a sinusoidal voltage signal of 1.5 V at 10 Hz for two hours consistently yielded reasonably-sized liposomes useful for image

analysis of their surface undulations. Further experimentation is being conducted to characterize membrane responses to various osmotic shocks by the use of a perfusion chamber.

Elucidating the Function of GABAergic Signaling during Neural Development in Larval Zebrafish

Benjamin Martin Kidd, CURO Research Assistant
Dr. James D Lauderdale, Cellular Biology, Franklin College of Arts and Sciences

The goal of my research project is to determine functional consequences of alterations in GABA signaling on brain activity and seizure dynamics in larval zebrafish. In all vertebrates, the GAD genes encode for the enzymes that produce GABA, which is the major inhibitory neurotransmitter in the central nervous system. There are two GAD genes, GAD1 and GAD2, and both function in GABA synthesis. We created a line of fish with a mutation in the GAD1 gene gad1b, which has increased neural activity. This project utilizes light sheet microscopy and electrophysiology to address our research goals. We are generating different lines of zebrafish that combine two fluorescent transgenes with the gad1b mutants with the goal of being able to visualize and assess the neurological effects of a reduction in local GABA levels in generating seizure activity in the brain. I will also be performing these experiments on a zebrafish seizure model that utilizes an alternative mechanism of generating seizures for comparison and proof of principle. I hypothesize that in the gad1b mutant zebrafish, I will observe over-excitation in the optic tectum of the zebrafish and the excitation will spread across the brain during a seizure event. We suspect that the inhibitory neurons will then corral the excitation to restore the brain to a non-seizure like state. If this hypothesis is supported, it will help us better understand the mechanism behind how seizures occur which could have implications in the design of novel anti-epileptic drugs.

A Computer Program for Truss Design Optimization

Sokngim Kim, CURO Research Assistant
Dr. Siddharth Savadatti, Environmental, Civil, Agricultural, and Mechanical Engineering, College of Engineering

Trusses are some of the most efficient load carrying structures that are extensively used in the design and construction of physical infrastructure like bridges, housing and power transmission towers. The ultimate purpose of this project is to develop a computer program that can provide the optimum design of a truss for a given set of loads. A standard truss analysis program has already been developed and it will be used for topology optimization using the harmony search method. The resulting truss will be shape optimized and can be used to design a truss either manually or automatically.

Research and Development of Satellite Software and Electronics

Adam King, CURO Summer Fellow, CURO Research Assistant
Dustin Mizelle, Anurag Banerjee
Dr. Marguerite Madden, Geography, Franklin College of Arts and Sciences

Is there an optimal way to interface electronic components and software such that the satellite adheres to mission specifications while mitigating all possible failure? The answer will allow the Small Satellite Research Laboratory (SSRL) to have UGA's first satellite in orbit by 2019. The first SSRL mission, SPOC, will acquire moderate-resolution hyperspectral imagery of coastal ecosystems and ocean color to enable mitigation of environmental damage by means of conservation, recreation, and development. Though hyperspectral imagery has been gathered from Low-Earth Orbit before, it has never been launched on the Cube Satellite platform, a modular structure standard consisting of 10x10x11cm units. Throughout the project, the SSRL has continuously been involved in writing extensive documentation for NASA to review our progress. To complete this mission, the electronics team first had to understand mission objectives, work with the SSRL mission operations team to determine operational modes and needed tasks, and to begin developing software corresponding to these specifications. The challenge comes when understanding hardware architecture and interfacing said hardware. The electronics team

will work with our primary manufacturers to determine what is needed to fulfill the mission. Namely, the SPOC optical payload will interface with our on-board computer as well as our electrical ground support equipment, a challenging step in the development of this mission, as various electrical communication protocols will have to be mapped correctly in order for software to interface correctly among all hardware. Preliminary hardware will be tested throughout this semester, and final design decisions will be finalized by April. Preliminary results indicate that optimal electronics and software design is characterized by working with both concurrently and building towards the functional "middle" of these systems.

Mild Traumatic Brain Injury (mTBI) Moderates Protection of Cognitive Flexibility by Cognitive Reserve

Evan Knox, Ramsey Scholar
Dr. Steve Miller, Psychology, Franklin College of Arts and Sciences

Cognitive reserve (CR) protects various mental faculties, including cognitive flexibility, from damage. One common form of this damage is mild traumatic brain injury (mTBI), often termed concussion. However, the interaction between mTBI and CR in predicting cognitive flexibility has not been explored. Such a relationship or lack thereof could further understanding of how CR relates to mTBI. A sample of 40 adults (mean age = 51.5, ages 36-68), with half having experienced at least two mTBIs during high school sporting events and the other half having experienced none, were surveyed for number of mTBIs, cognitive flexibility, and a proxy measure of CR. Moderation analysis was performed to assess interactions for both a no-mTBI/mTBI dichotomy and for a no-mTBI/two-mTBI/greater-than-two-mTBI split. Dichotomous moderation demonstrated a beta of .839 ($p < .001$) for the mTBI group, versus a beta of .569 ($p = .006$) for the no-mTBI group. Furthermore, this model (also accounting for age) gave an adjusted R^2 of .652 in the mTBI group, versus .391 in the no-mTBI group. The three-way moderation demonstrated a beta of 1.061 ($p < .001$) for the greater-than-two-mTBI group, versus a beta of .498 ($p = .001$) in the no-mTBI group. This moderation model also accounted for significantly more variance than a no-moderation model ($p = .005$). These findings suggest that cognitive flexibility is well-protected from mTBIs by high CR, while it is disproportionately at-risk in individuals with low CR.

Georgia Social Workers and DACA

David Kobe, CURO Research Assistant
Dr. Jane McPherson, Social Work, School of Social Work

There are approximately 2 million undocumented students in the US, many of whom immigrated with their parents when they were too young to understand the educational implications. To help these students Obama created Deferred Action for Childhood Arrivals (DACA) allowing certain immigrants special status to attend public school, get drivers licenses, and get jobs. Georgia and two other states have additional policies banning undocumented immigrants from attending selected public state universities. This ban in Georgia directly opposes the Equal Protection Clause of the Fourteenth Amendment and legally segregates public universities. The problem these students face is worthy of social work consideration. The Georgia Chapter of the National Association of Social Workers (NASW) released a statement declaring it does not support the ban. The University of Georgia (UGA) has an interesting position as a public university selected in the ban, yet home to a strong Social Work program. To understand opinions of the students and faculty of the School of Social Work at UGA we created a survey focusing on the awareness participants have of current policies surrounding DACA and immigration in Georgia. Having an accurate idea of how social work students view current policies that directly affect their clients is vital. If our social workers disagree with the code of ethics how can it be expected to be implemented? If there is an overwhelming agreement with the current code of ethics then why do the policies for our state contrast them so sharply and what can we do about it?

Characterizing Ty1 Gag - CCT Complex Interactions in Budding Yeast Through Co-Immunoprecipitation and Mass Spectrometry

Ellen Grace Krall

Dr. David J Garfinkel, Biochemistry and Molecular Biology, Franklin College of Arts and Sciences

Retrotransposons are mobile genetic elements that are able to actively replicate, reinsert into the host genome, and alter the expression of genes. Ty1 elements are the most abundant retrotransposon in the budding yeast *Saccharomyces* and represent a model for better understanding retroviruses like HIV as well as retrotransposons found in other organisms. Budding yeast lacks typical defense systems used to silence retroelements in other eukaryotes, and therefore has evolved a novel form of copy number control (CNC) to restrict Ty1 retrotransposition. Recent studies by Saha and Mitchell et al. in 2015 (*J. Virol.* 89:3922-38) show that an alternate Ty1 sense transcript (Ty1i RNA) encodes a 22-kDa protein which is necessary and sufficient for Ty1 CNC. It is likely that other cellular proteins associate with the Ty1 capsid protein (Gag) and influence virus-like-particle (VLP) assembly, Gag processing, and Gag-p22 interactions. Because systematic mutant screens are unable to identify essential or redundant gene products that associate with Gag, we have used proteomic analyses to characterize the Gag interactome. We have identified multiple subunits of the CCT complex, a conserved and essential protein chaperone that may interact with Ty1 Gag. Mutational analysis suggests that the CCT complex plays a role in Ty1 Gag processing and retrotransposition.

Tagging Fatty Acid Metabolism Proteins in *Trypanosoma cruzi*

Evelina Kravchuk
Dr. Rick Tarleton, Cellular Biology, Franklin College of Arts and Sciences

Trypanosoma cruzi infects millions of people worldwide, mostly in Latin America, causing potentially life-threatening sickness known as Chagas disease. This protozoan replicates within the cytoplasm of mammalian cells and persists in particular host tissues, especially muscle, leading to heart and gastrointestinal pathologies. There are currently no reliable drugs or vaccines for treatment or prevention of *T. cruzi* infection. An attractive target for new drugs is transporter proteins, enzymes, and molecules necessary for the pathogen to obtain energy from host cells. Previous investigations indicate that fatty acid (FA) transport and metabolism proteins are highly upregulated in intracellular amastigotes of *T. cruzi* and are essential for parasite survival. Interestingly, the genes encoding mitochondrial surface FA transporter proteins are duplicated in *T. cruzi* and modified, perhaps to allow localization to the parasite surface where they could compete with host cell mitochondria for FAs. We will use CRISPR/Cas9-mediated genome editing to tag the essential fatty acid transportation and metabolism genes in *T. cruzi* and thus document their cellular sublocalization. Homology directed repair will be used to insert a sequence encoding a fluorescent tag, which when incorporated into gene products can be visualized using fluorescence microscopy. We expect to find that *T. cruzi* has a duplicated set of FA transporters, one set that localizes to the parasite surface and another that localizes to the usual parasite mitochondrial surface membrane. If true, this will be the first reported example of a pathogen mitochondrial FA transporter being relocalized in order to scavage FA from host cells.

Understanding American and Cuban Perceptions of Migration to America

Mohammed Khalifa Kredan, CURO Research Assistant
Dr. Micah Gell-Redman, International Affairs, School of Public and International Affairs

More than 2 million Cubans currently reside in the United States, and roughly 60% are legal residents. Thanks in part to policies such as the Cuban Adjustment Act, Cuban migrants are able to secure a green card in just 1 year, and are more likely to be naturalized than immigrants from other nations. Major policy changes carried out by previous and incoming US administrations promise to impact all aspects of the relationship between the two nations, not least of which is the question of Cuban immigration to the US. Cuba promises to be an important case, answering many questions regarding immigrant motivations, and the perception of the effect of policy change. This is especially true, as other nations around the world send a mix of immigrant populations affected by similar political and economic motivations. We explore Cuba-US migration through a multi-method, binational approach. First, we conduct an electronic survey of Florida

voters to determine what qualities of Cuban immigrants are viewed as most "desirable." Second, through semi-structured interviews, we learn how Cuban nationals perceive the process of migrating to the US. By combining insights from these two lines of inquiry, we hope to identify gaps between US citizen beliefs about Cuban immigration, and the drivers that actually motivate potential migrants within Cuba.

The Role of LNFPIII-Dex on Cholesterol Efflux in Raw 264.7 Cells

Catrina Kure
Dr. Donald Harn, Infectious Diseases, College of Veterinary Medicine

Atherosclerosis is a major risk factor for cardiovascular diseases. Current means of prevention and treatment focus on lifestyle changes, including changing diets to include more anti-oxidants and anti-inflammatory foods and increasing physical activity when possible. In addition, statin therapy, to help control cholesterol levels. Each of these may help reduce plaques. In this regard, little research has been done examining potential immunotherapies related to plaque progression. LNFPIII is a biologically conserved human milk sugar, that when used as a conjugate, has been shown to function as therapeutic for treatment of several different inflammation based diseases, generally by activating anti-inflammatory (M2) macrophages. Gene arrays on cells stimulated in vitro along with analysis of cells from animals treated with LNFPIII-Dex conjugates both show an upregulatioin the transcription factor LxRα, which controls genes involved in cholesterol efflux. Thus, my research project asks if LNFPIII-Dex will induce cholesterol efflux from RAW 264.7 cells via downregulation of inflammatory genes and upregulation of mediators related to reverse cholesterol transport. This will be tested with RAW 264.7 macrophages that will be loaded with the fluor-tagged cholesterol (22-NBD-Cholesterol). We will first determine that we are able to successfully load the RAW cells with cholesterol by flow cytometry. Once we demonstrate we can load cholesterol into RAW cells, we will then stimulate the cells with positive and negative controls and LNFPIII-Dex for 3-12 hrs. We will then add the cholesterol acceptors HDL or ApoE, and allow efflux to occur. We will measure efflux in each well of cells using a plate reader. If we demonstrate that LNFPIII-Dex is able to induce cholesterol efflux from RAW 264 macrophages, we can propose LNFPII-Dex as a therapeutic to reduce plaque formation in vivo.

The Chromatin Remodeling Protein, ATRX, Regulates the Formation of Non-Canonical DNA/RNA G-Quadruplex Structures in Mammalian Oocytes

Ashley Elizabeth Lall
Dr. Rabindranath De La Fuente, Physiology and Pharmacology, College of Veterinary Medicine

One of the major chromatin remodeling proteins, alpha thalassemia mental retardation x-linked protein (ATRX) plays an important role in providing genomic stability that is essential for reproductive cells to successfully undergo cell division. The primary role of ATRX is to ensure proper heterochromatin formation in oocytes during meiosis. In transgenic (Tg) oocytes lacking ATRX, there are severe chromosomal abnormalities that often result in early loss of pregnancy. This experiment is aimed at elucidating the role of ATRX in the formation of non-canonical DNA/RNA quadruplex structures by using immunochemistry, epifluorescence microscopy, and super-resolution chromatin analysis of wild type (WT) and Tg oocytes. DNA G-quadruplex structures are associated with regions of guanine-rich DNA and cause genomic instability by affecting chromosome configuration. We hypothesized that Tg oocytes would have a higher prevalence of DNA/RNA quadruplexes as a result of the important role ATRX plays in regulation of these structures. Our results indicate that there is no statistically significant difference in the proportion of quadruplex formation between transcriptionally active WT (94%) and Tg (91%) oocytes. Notably, quadruplex RNA structure is resolved in 70% of transcriptionally inactive WT oocytes, while non-canonical RNA structure remains unresolved in 80% of Tg oocytes. These results suggests that ATRX deficient oocytes are unable to correctly remodel their chromosome configuration which results in a higher percentage of DNA/RNA quadruplexes and provides direct evidence that ATRX is necessary to resolve non-

canonical G-quadruplexe structures to maintain genome stability.

Retirement Planning Behavior and Retirement Plan Participation among Men and Women: An Examination of the Determining Factors

Sarah Landa
Dr. Swarn Chatterjee, Housing and Consumer Economics, College of Family and Consumer Sciences

As the largest cohort of the US population, the baby-boomers, continue to enter retirement, it is critical to examine the factors associated with better financial planning and investment participation decisions among households, and whether men and women differ in their approach to retirement planning. With this research objective in mind, our study uses a nationally representative dataset to examine whether men and women differ in their retirement planning behavior. This study also examines the factors that are associated with retirement plan participation among men and women. We use a multiple regression analyses to empirically test the key hypotheses of this study. Early findings reveal that a significant gender difference exists in the portfolio preferences and retirement planning behavior among households. Additionally, risk tolerance appears to affect retirement planning decision's differences for men and women. The implications of the key findings of our study will be discussed from a policy perspective.

Measuring the Expression Efficiency of Constructed Single Plasmid System in *Trypanosoma cruzi*

Tre Justin Landry, CURO Research Assistant
Dr. Rick Tarleton, Cellular Biology, Franklin College of Arts and Sciences

Our lab focuses on the host immune responses to infection with protozoan parasite *Trypanosoma cruzi*, the causative agent for Chagas disease, and how these responses may be modified or potentiated through genetic manipulation. My research addresses the technical obstacles to expressing multiple, potentially immune-modifying proteins in *T. cruzi*. In the past, this process has required the introduction of multiple plasmids encoding these genes and selection by multiple drug resistance markers. To make the process of genome modification more efficient, we have evaluated both viral-like 2A peptide sequences that induce a skip during translation, allowing for the production of two distinct proteins from a single gene transcript, and multiple head-to-tail expression cassettes that yield two separate mRNA transcripts from a single plasmid. We now show that both systems provide for the production of multiple protein products from a single plasmid but that different 2A-like sequences are differentially efficient in this process. Likewise, distinct intergenic regions impact on protein production from the expression cassettes. Future experiments will quantify the relative efficiency of the two systems, also comparing them to protein expression from multiple plasmids, and the positional impact (e.g. before or after the 2A skip sequence) on protein production. Additionally we plan to combine the 2 new systems in order to produce up to 4 different proteins from the same plasmid. These methods are facilitating the development of a conditional inducible expression system in *T. cruzi* that utilizes a tetracycline inducible ribosomal RNA (rRNA) promoter to control expression in transgenic parasites.

The Development of a Pathogen-Specific Diagnostic Device for Pneumonia

Laura Lanier
Dr. Ramana Pidaparti, Environmental, Civil, Agricultural, and Mechanical Engineering, College of Engineering

Pneumonia is one of the single largest infectious diseases in the world, affecting 450 million people globally and killing nearly 4 million people each year. More than 30 strains of bacterial and viral pathogens can cause this infection of the lungs—a fact that poses a significant challenge to improving accuracy in diagnostics for an appropriate pathogen-specific treatment. In this project, we are developing a pathogen-specific diagnostic device with the principles of Raleigh scattering. We are currently in the stage of proving this concept of particle-caused light scattering, with our experiments focused towards developing a forward scatter laser system where particles of known size and shape resembling the real pathogens are tested. The scattered beam

information from these particles is captured on a sensing device and this signal data, after noise removal, is processed for particle size range by applying various classifier algorithms. Identification of particle size range can provide baseline diagnostics for the disease, and further refinements for identifying pathogen types by their size are possible. After this proof of concept, we plan to embed this system into a portable, low cost mask, which can be integrated with a cell phone. It is our hope that patients can then breathe or cough into this mask, releasing particles for identification and diagnosis. This device, once realized, is expected to become a powerful diagnostic tool for the populations most affected by pneumonia, particularly in developing and underdeveloped countries.

Unlock the Vote: The Implications of Felon Disenfranchisement Laws on the Political Power of African Americans

Magali Lapu
Dr. Sarah Shannon, Sociology, Franklin College of Arts and Sciences

This policy paper seeks to answer why felon disenfranchisement has decreased civic participation among the African American community as a whole, examines literature on differing state-by-state laws, and offers policies to reverse and alleviate their disparate effect on that demographic. Per the ruling of the 1974 Supreme Court case *Richardson v. Ramirez*, there is a legal precedent that allows states to continue to restrict the voting rights of anyone who has served time for a felony. This includes non-incarcerated felons who have either completed their sentences or are on parole or probation. Because of disproportionate incarceration rates for convicts of color, a disproportionate number of minorities are barred from voting. Disenfranchisement laws have shut out minority demographics, given advantages to politicians in parties that do not have a large minority voter base, and affected law abiding citizens without a criminal record. After analyzing the effectiveness, cost, equity, public approval, and political feasibility of the three proposed policy alternatives against the status quo, this paper finds that the best option is to incentivize non-profits to mobilize voters in communities with large disenfranchised populations and low voter turnout of enfranchised community members.

Socioculturally Attuned Family Therapy: Guidelines for Equitable Theory and Practice

Lauren Jayne Lauterbach, CURO Research Assistant
Dr. J. Maria Bermudez, Child and Family Development, College of Family and Consumer Sciences

Family therapists practice based on diverse family models, but have recently lost sight of the social context in which families live. This scholarly book views a plethora of different models from a different perspective. This perspective is referred to as a socioculturally attuned lens. This lens strives to incorporate social context, power, and culture into the current family therapy models. The question we dive into in this text is, "How can practitioners integrate awareness of societal systems across models into their everyday work with individuals, couples, and families?" This question is addressed chapter-by-chapter, covering ten different family therapy models and intertwining third party change and a sociocultural lens with these models. There is a disconnection between family therapy models and the integration of social context, culture, and power, and this often leaves family therapists uncertain on how to use current family therapy models while supporting social equity. This book offers practical advice on incorporating sociocultural attunement into their everyday practice. We strive to educate family therapists on helpful ways to practically incorporate social context, power and culture through what we refer to as a sociocultural attuned lens. We believe that therapist can incorporate this lens with any type of family therapy practice, but in this text we focus specifically on ten different therapy models.

Blood Transfusion Related Zika Virus Transmission

Casey Lawrence, CURO Research Assistant
Dr. José F Cordero, Epidemiology and Biostatistics, College of Public Health

Zika Virus (ZIKV) is an arbovirus of the *Flaviveridae* family, transmitted primarily by *Aedes*

aegypti and *Aedes albopictus* mosquitos. ZIKV was first discovered in the Zika forest in Uganda in 1947 and has presented itself sporadically since then, with the most notable outbreaks occurring in Yap Island in 2007 and Brazil, likely beginning in 2014. ZIKV is roughly 80% asymptomatic, which could lead to major issues maintaining a safe blood supply. Many ZIKV infections go undiagnosed or misdiagnosed and evidence has emerged that blood donations have been compromised. The objective of this review is to examine past arbovirus outbreaks, and intervention and policies strategies that were used to protect blood donations. We searched PubMed, Google Scholar and Web of Science for literature related to blood and organ donation policy changes and interventions that were associated with outbreaks of dengue, chikungunya, West Nile virus, and other arboviruses. Our results focused on findings from the United States but also include relevant information from other countries. It is essential that blood and organ donation supplies are protected in during an infectious disease outbreak. This review presents recommendations for preventing ZIKV transmission from blood and organ transmission. Traditional blood donor screening and laboratory testing may not be sufficient prevention measures. Emerging detection strategies such as Nucleic Acid Testing (NAT) and pathogen inactivation techniques may be effective tools. Blood and organ donation safeguards must be flexible to the threats of emerging pathogens including but not limited to ZIKV.

Structural Design and Optimization of the SPOC Cube Satellite

Megan Le Corre, CURO Research Assistant
Graham Grable
Dr. Susanne Ullrich, Physics and Astronomy, Franklin College of Arts and Sciences

The primary purpose of a satellite's chassis or structure is to ensure that the satellite survives the rigors of launch, including dangers posed by the vibration and acceleration imposed by the launch vehicle. Launch is the first danger that a satellite faces once its mission begins. If the satellite structure fails in launch, the failure is irredeemable. The purpose of this research is to determine optimal structural design for the SPectral Ocean Color (SPOC) imaging satellite being built by the University of Georgia's Small Satellite Research Laboratory. Accomplishing this task requires several iterations of the engineering design process and conduction of analyses of increasing complexity. Structural analyses were primarily conducted in ANSYS; analyses conducted include modal analysis and inertial loading analysis. Two of the satellite subsystems, the payload and core avionics, were simulated as representative masses within the structure. It is important to recognize that this adds additional rigidity to the satellite, but is a necessary step to determine areas of optimization. First natural frequencies seemed to be nominal, ranging from 180.73 Hz to 246.94 Hz, depending on orientation during launch. Yield factors of safety ranged from 1.06 to 4.72 and ultimate factors of safety ranged 1.39 to 5.77. Though not indicative of failure, these values are uncomfortably low. Changes to be implemented as a result of this research include addition of stack interface ribs and an optimization of the payload structure in order to reduce inertial loading.

Determining Reoccurring Tick and Tick-Borne Disease Associations with Mammal Hosts

Jenna Kay Lea, CURO Research Assistant
Dr. William Park, Ecology, Odum School of Ecology

I am utilizing the Global Mammal Parasite Database to study associations between several species of ticks and parasites causing tick-borne diseases (TBD) on or in mammal hosts. I intend to find which hosts share ticks and TBDs, and identify common characteristics they have that make them more susceptible to the vector and/or pathogen. I will do this by creating two networks using R Studio: one describing the connections between hosts and ticks and the other comprised of connections between hosts and TBDs. This will not only create an easily interpretable visual representation of the data, but will build a foundation for further research to be done on parasite sharing. For instance, my preliminary data analysis will identify centralized hub host species that share ticks or TBDs with several other host species. This lays the groundwork to characterize common characteristics (e.g., body size, diet, and longevity) of hosts that play a disproportionate role in parasite sharing between species. The

extent to which the two networks are congruous is currently unknown, but I expect to find stronger associations between ticks, TBDs, and hosts that are herbivorous and long-lived. An herbivorous diet would result in a more frequent contact rate with vegetation containing ticks, and a long-lived host will have more opportunities to encounter ticks that transmit TBDs. Identifying which characteristics make hosts more susceptible to ticks and TBDs has the potential to help predict the risk of host-tick associations and TBD transmission, as well as identifying hotspots for risk of human-acquired TBDs.

From Trash to Fashion: Converting Polyethylene Terephthalate into Fabric

Cathy Lee, CURO Research Assistant
Dr. Suraj Sharma, Textiles and Merchandising, College of Family and Consumer Sciences

The impact of the clothing industry has been highly detrimental to the environment due to the overconsumption of resources and the increase of cheap, mass-produced garments that have short life spans. Plastic water bottles, made of polyethylene terephthalate, also accumulate waste, which can be combatted by creating a cradle-to-cradle life cycle in a sustainable way. This can be achieved by integrating the two polluting sources by converting the discarded polymers, found in local landfills or recycling facilities, into filament yarns than can be weaved into a wearable fabric. The developed process involves first the reduction of the recycled material into a pellet form that can then be extruded into filament fiber form. To do this I assembled and calibrated the dual-band extruder to the best temperature for the pellets and calculated the amount of yarn and fabric one bottle created. The yarn is extruded from a die with a 1/10,000-inch diameter and a round cross-sectional shape. The filaments are then subjected to standard textile testing methods outlined by the AATCC, and its performance characteristics is further compared to similar non-recycled synthetic fibers to determine qualities such as yarn strength. The results from the textile testing processes are forthcoming but when released I will also compare the statistical performance data of standard fibers, yarns, and fabrics and the recycled synthetic material to measure the wearability of the new fabric. These studies will aid sustainability efforts in the fashion industry through this developed process and compilation of testing data and analysis.

Interactive Animatronics in Consumer Environments

Christina Lee, Foundation Fellow
Dr. David Z Saltz, Theatre and Film Studies, Franklin College of Arts and Sciences

Entertainment and consumer industries around the world are striving for innovative yet economical ways to interact with consumers and craft more personalized and unique experiences. In this project, I am fabricating an interactive animatronic puppeteered through radio-transmittance. The trans-locational motion of the form is controlled with medium-range radio frequencies and is separate from the rest of the system. The input sensory devices, such as the microphone, and the output sensory devices, such as the voice modulation and nontrans-locational motion, are integrated into a singular system and run from a programmed microcontroller housed within the unit. Some challenging aspects of this project are ensuring that the input and output devices are strong enough to provide a suitable range for interaction while providing sufficient power to necessary motors without surpassing weight parameters of the figure. The project includes the design, fabrication, and optimization of the movement, sensory input, voice modulation, and sensory output of the figure. I will be comparing the final project with interactive animatronics currently in use in industry environments such as theme parks and haunted attractions.

A Preliminary Evaluation of Supplemental Vitamin E Form on Serum α-Tocopherol Levels and Oxidative Stress Parameters Measured in Response to a Novel Exercise Challenge

Kendall Lee
Dr. Kylee Duberstein, Animal and Dairy Science, College of Agricultural and Environmental Sciences

Vitamin E is a component of the antioxidant system and is commonly included in commercial horse feeds in the form of synthetic α-tocopherol acetate. The purpose of this research was to assess

the effect of supplemental vitamin E form on serum α-tocopherol levels and oxidative parameters in mature horses at rest and in response to an exercise challenge. Sixteen horses first underwent a 2wk low vitamin E wash-out period and were then randomly assigned to one of four treatment groups, each receiving the control diet plus 4000 IU/day of vitamin E for 14 days: (1) synthetic all rac-α-tocopherol acetate powder, (2) natural RRR-α-tocopherol acetate powder, (3) micellized RRR-α-tocopherol liquid, (4) micellized RRR-α-tocopherol powder. At the completion of the feeding trial, horses began a two day standard exercise test. Blood was collected at days 0, 7, 14 of the feeding trial and pre and post exercise. Serum α-tocopherol was higher on days 7 and 14 as compared to day 0 in all treatment groups with no differences between treatment groups. Average serum α-tocopherol levels were higher in horses supplemented micellized forms as compared to synthetic and natural acetate powder over the three exercise time point sampled ($P<0.05$). Additionally, horses fed micellized RRR-α-tocopherol maintained whole blood GSH-T levels following exercise, whereas horses receiving acetate bound forms showed a post exercise decrease in whole blood GSH-T ($P=0.03$). Findings of this study indicate that micellized RRR-α-tocopherol is superior to other vitamin E forms in maintaining serum α-tocopherol and antioxidant status in response to a novel exercise test.

All Things in Moderation: The Effect of Moderation Messages on Food Perceptions

Mitchell Lee
Dr. Michelle R vanDellen, Psychology, Franklin College of Arts and Sciences

Heart disease is the number one cause of death in the United States and obesity has been increasingly linked to being a cause of it. Although it is easy to point to overeating as the cause of obesity, there is no clear explanation for why people overeat. The purpose of the present study was to study the effect of how different messages on consumption habits impact people's perceptions of food. We hypothesized that exposing people to different messages about healthy eating habits would change how healthy they thought certain foods were. In order to test this hypothesis, participants came to the lab and saw one of four different messages regarding how to maintain healthy eating habits. Participants then saw images of various foods and asked to rate how healthy they perceived those foods. Results found that telling people that eating foods in moderation is okay results in people considering more foods as healthy than they would otherwise. This suggests that one reason for overeating is that when people are told that eating unhealthy foods in moderation is acceptable they are more comfortable with the idea of eating them. A study examining consumption is testing this idea.

The Effect of Lutein and Zeaxanthin Supplementation on Emotional Well Being

Paul Lee, CURO Research Assistant
Dr. Lisa Renzi Hammond, Psychology, Franklin College of Arts and Sciences

Dietary carotenoids lutein (L) and zeaxanthin (Z) are the only carotenoids in the neural retina and are the dominant carotenoids in the neocortex. Here, L in particular is thought to directly influence neural communication. Past research suggests that supplementation with L and Z can improve visual processing speed, reaction times and cognitive function across the adult lifespan. Despite the fact that L is widespread in the neocortex, past research has focused predominantly on only one output of a healthy brain: cognitive function. If L influences neural communication throughout the brain, other behavioral outputs of a healthy brain should also be observable, such as emotional processing. The purpose of this study was to test this hypothesis in 51 healthy older adults and 51 healthy young adults from the UGA and surrounding Athens-Clarke County community. Participants were randomized into two groups, one that received 12 mg / day L+Z, and one that received a visually identical placebo. Emotional processing data were collected using the CNS Vital Signs computerized testing platform at baseline, 4-months, 8-months and 12-months of intervention. L+Z status was measured in the neural retina as macular pigment optical density (MPOD). Analyses are ongoing, and results will be presented at the symposium.

Current Investigations of Chromium Photocatalyzed [4+2] Cycloadditions

Sang M Lee, CURO Research Assistant
Dr. Eric M Ferreira, Chemistry, Franklin College of Arts and Sciences

Photoredox catalysis is an emerging field in modern organic chemistry with visible light as the source of energy to enable transformations previously inaccessible by traditional means. Recently, earth-abundant photocatalysts have been employed in a radical cation Diels-Alder cycloaddition of electron-rich dienophiles. Current literature suggests that the electron-rich alkene is rendered electron-poor after single electron oxidation by the catalyst, allowing it to cyclize with the diene. Electron-poor dienophiles have also been employed in this net [4+2] reaction, but because the Cr complexes themselves are not strong enough to oxidize electron-poor olefins, current research in the lab promotes the idea that it reacts with the diene through an alternative pathway. Experimental evidence suggests a light-mediated [2+2]-cycloaddition, followed by a Cr-catalyzed vinylcyclobutane rearrangement. This rearrangement yields the net [4+2] product with reversed Diels-Alder regioselectivity. Current understanding of the cycloaddition requires further studies on the effects of electronics and sterics in order to elucidate the mechanism. For this study, dienophiles of various steric bulk and electronics were used to determine the efficiency of the cycloadditions based on these criteria to assess π-π stacking interactions in a putative catalyst-substrate association complex.

Effect of Reproductive State on Parasite Infection in Wild Rodents

Soo Min Lee
Dr. Vanessa Ezenwa, Ecology, Odum School of Ecology

Sex steroid hormones are known to have strong effects on the mammalian immune system. Testosterone has been shown to suppress immune function in males, while estrogen can enhance certain mechanisms of the immune system in females. Importantly, these hormone-associated changes in immunity can affect parasite susceptibility. Since rodents tend to shift in and out of actively reproductive states on relatively short time scales, changing their hormone levels, this study focused on wild cotton mice (*Peromyscus gossypinus*) and hispid cotton rats (*Sigmodon hispidus*) in Georgia. We will test to see whether the reproductive and non-reproductive states alter the intensity of parasite infection. Additionally, we will examine the number of parasite species between males and females. To assess differences in parasite infection, we will use fecal samples collected from each species during non-reproductive and reproductive periods to measure the intensity of the gastrointestinal parasites. We expect reproductively active individuals to be infected with a higher intensity of parasites and a greater number of parasite species. Additionally, the reproductive males are expected to be more infected than the reproductive females. This study will reveal the effect of reproductive state on the parasitic infection.

Off-Target Effects of the Inhibitor MRS2578 on the Formation of Neutrophil Extracellular Traps

Tae-In Lee, CURO Research Assistant
Dr. Balazs Rada, Infectious Diseases, College of Veterinary Medicine

Within the joints of patients with gout, the deposition of monosodium urate crystal drives the accumulation of polymorphonuclear leukocytes. At the site of infection, neutrophils primarily engulf pathogens exposing them to antimicrobial compounds such reactive oxygen species produced by the NADPH oxidase. However, in gout in response to monosodium urate crystal deposition, PMNs undergo another antimicrobial activity called NETosis which is the release of chromatins, granule proteins and DNA into the extracellular space to form neutrophil extracellular traps. NETs immobilize pathogens preventing further dispersal, but uncontrolled formation of NETs also leads to several diseases such as gout. Previously found, MRS2578 inhibits a purinergic P2Y6 receptor in THP1 macrophages and keratinocytes yet at a higher level than the inhibitor's IC_{50} value. Therefore, MRS2578 loses its inhibitory effect around its IC_{50} value proposing potential off-target effect. Here, we examined the effect of MRS2578 at much lower concentrations and of zinc—an inhibitor of proton channels—on NET formation. Zinc reduces NET formation stimulated by MSU crystals suggesting the involvement of the proton channel. Since NETosis is dependent on NADPH

oxidase and phorbol-12-myristate-13-acetate (PMA) triggers NETosis by activating protein kinase C, which activates NADPH oxidase, PMA was used for positive control of NET formation. Our data indicate that the purinergic MRS2578 inhibitor can have off-target effects, likely inhibiting the NADPH oxidase or its associated proton channel, which sheds novel light on its potential use for inhibiting neutrophil activation in diseases including gout.

A Study of Interstellar Intermediate Velocity Gas Clouds

Bjorn Leicher, CURO Research Assistant
Dr. Robin Shelton, Physics and Astronomy, Franklin College of Arts and Sciences

Intermediate Velocity Gas clouds (~80 km/s) are enormous clouds of neutral atomic Hydrogen that travel throughout the galactic halo; the area of dust and gas surrounding our galaxy. As a result, the gas clouds experience numerous changes in their characteristics. In this research, we use hydrodynamical simulations to analyze the changes in these characteristics over the duration of its lifetime (~5-10Myr). Three different simulations are run for three different speeds of the cloud (60, 80, and 100km/s). By using speed as a control variable, we can see how it affects the other aspects of the cloud. Through the analysis of IVCs, we attempt to answer questions such as where these clouds come from and how they play a role in the galactic fountain process, if any. Because IVCs have not yet been extensively studied, the primary focus of this study is to gain a better understanding of the clouds holistically.

Competing Pressures: Tipping the Scales in the Prosecution of Rape and Sexual Violence

Zoe Li, Foundation Fellow
Dr. Maryann Gallagher, International Affairs, School of Public and International Affairs

The treatment of the issue of rape and other forms of sexual violence in international law is continually evolving. Prosecutors are coming across increased cases of rape and sexual violence crimes that can potentially be brought to trial. Of those that could be brought forth, however, only a fraction of them actually pursue the charges. This begs the question, why? This paper presents a potential explanation involving opposing pressures that prosecutors in the international criminal courts face when choosing which cases to take on: "win" pressure and "outsider" pressure. In this argument, "win" pressure refers to the internal pressure applied by prosecutors upon themselves to "get the win" or take on cases they deem most likely to garner a conviction. On the challenging side, there is "outsider" pressure, which refers to the influence of any other actors outside the Office of the Prosecutor, including judges, non-governmental organizations, international organizations, and individuals outside the court. Inner "win" pressure usually acts as a discourager for rape and sexual violence cases, while "outsiders" are usually sources that push for increased rape and sexual violence indictments. It is in the way that these two competing pressures are reconciled that determines whether or not rape/gender-based violence crimes are charged against perpetrators in the international courts. The study of these prosecutorial motivations can enhance our understanding of international humanitarian law and contribute to the development of the most effective ways to reform and ameliorate it.

Nanofibrous Pectin Scaffolds for Biomedical Applications

Nathan Likens, CURO Research Assistant
Dr. Sergiy Minko, Chemistry, Franklin College of Arts and Sciences

In today's rapidly growing field of biomedical applications, biocompatible materials are increasingly sought after. Pectin, a polysaccharide found in plant cell walls, is one such material. This heteropolysaccharide is composed of homogalacturonans, rhamnogalacturonans, and substituted galacturonans. The goal of this experiment is to create scaffolding from crosslinked pectin nanofibers for tissue engineering and drug delivery use. Many previous attempts at creating nanofibrous scaffolding involved the use of toxic or flammable solvents which is not conducive for a biocompatible application. The process of elecrospinning the pectin polymer into nanofibers creates a high surface area to volume ratio which is ideal for cell adhesion, proliferation and differentiation. Previous experiments have been conducted with

chitin, which produced promising results; however, the addition of pectin enhanced the mechanical structure of the scaffold. Our goal is to find an ideal concentration of pectin to optimize the tensile strength, cell viability, and ultimate decomposition of the nanofibrous scaffold.

Sensitive Liquid Chromatography/Tandem Mass Spectrometry Method for the Determination of a Novel Highly Lipophilic Anti-Cancer drug Candidate in Rat Plasma and Kidney Tissue

Michael Linzey, CURO Research Assistant
Dr. Michael Bartlett, Pharmaceutical and Biomedical Sciences, College of Pharmacy

Prostate cancer (PCa) is the second leading cause of cancer related deaths in males. When PCa forms metastasis they develop onto the bone and it is these migratory tumor cells that cause most morbidity and mortality. There are currently no satisfactory treatment options for bone metastatic PCa. There is a great need to further develop treatments that will fill this need. There is a group called amino-bisphosphonate derivatives that have shown promise in targeting bone metastatic PCa. These compounds have been shown to be highly lipophilic so understanding where they partition is extremely important. LG1980 is a representative molecule of this class. It selectively induces apoptosis in aggressive PCa cells. This particular candidate is in pre-clinical studies to test its toxicity and pharmacokinetic properties in animals. There needs to be an accurate and reproducible method for quantifying the drug concentrations in various organs. The purpose of this investigation was to develop and validate a selective, sensitive, and robust LC-MS/MS method for quantification of this highly lipophilic anti-cancer drug candidate in rat plasma and kidney tissue. This bioanalytical method was validated in accordance with current FDA guidelines including accuracy and precision of inter- and intra-batch variation, specificity, linearity, limit of detection, limit of quantitation, recovery, and stability. While this specific drug candidate may fail, it is worth noting that this method could be applicable for the quantifications of other amino-bisphosphonate derivatives in biological samples with minor modifications to the method.

Consumers as Curators: Brand Use in Social Media

Lydia Liu, CURO Research Assistant
Dr. John Hulland, Marketing, Terry College of Business

Online consumer curation describes the behavior of gathering, selecting, and assembling online content into a display. Consumers may use art, photos, text, product images, and brands in their curation efforts. This behavior is an understudied way in which consumers are engaging with brands online, and thus is important for marketers to understand. The current research is focused on uncovering what information about curated brands is related to the popularity of an online display, in order to understand what characterizes an influential display. To address this question, data were collected from a social media site centered on the creation of curated displays. A regression analysis will uncover what information about the curated brands (e.g., the general popularity of the items, price statistics, and the number of unique brands) is related to the popularity of the curated display. Further, results will be compared across two groups on the social media site in order to address the generalizability of our findings. This research will move our knowledge of online consumer behavior forward and provide important information for managers about how consumers are using brands online.

Distribution of Ticks on Cervids and Prevalence of Selected Tick-Borne Pathogens in These Ticks from Kentucky

Bessie Lockwood, CURO Research Assistant
Dr. Michael Yabsley, Forestry, Warnell School of Forestry and Natural Resources

In recent decades, white-tailed deer (*Odocoileus virginianus*) populations have increased dramatically, partially due to the conversion of farmland to forests. Furthermore, more people have moved to areas adjacent to woodland habitats. Thus, vector-borne diseases are becoming increasingly more prevalent in humans and domestic animals. Vector-borne pathogens can also cause disease in various wildlife species.

In this study, ticks were collected from cervids in Kentucky, identified to species, and selected species tested for causative agents of Lyme disease (*Borrelia burgdorferi*) and spotted fever (*Rickettsia parkeri*). Four different tick species were collected including the winter tick (*Dermacentor albpictus*), lone star tick (*Amblyomma americanum*), black-legged tick (*Ixodes scapularis*), and the Gulf coast tick (*Amblyomma maculatum*). *D.albipictus* was detected in 42 counties, *I.scapularis* was detected in 41 counties, *A.americanum* was detected in 16 counties, and *A.maculatum* was detected in 7 counties. These four tick species were detected throughout Kentucky indicating the risk of tick-borne pathogens statewide. Of 173 *I. scapularis* ticks tested for *B. burgdorferi*, 11% were positive. Of 43 *A. maculatum* ticks tested for *Rickettsia sp.*, 19% were positive and sequence analysis indicated several *Rickettsia spp.* were detected. Further research will be done to determine the exact species of *Rickettsia* present. The data provides important data on the current distribution of tick species present in Kentucky and their associated pathogens.

Investigating the Role of Cyanogenic Glycosides as a Potential Defense for *Passiflora incarnata* against *Agraulis vanillae*

Atul Lodh, CURO Research Assistant
Dr. Rodney Mauricio, Genetics, Franklin College of Arts and Sciences

Plants produce the largest variety of secondary metabolites of any organism on the planet. However, the evolutionary forces that generate this diversity are still unknown. A leading hypothesis is that these metabolites serve as defenses against insect herbivores that utilize plants as a food source and that herbivores evolve to combat these defenses in response. To test the hypothesis that cyanogenic glycoside is a defensive metabolite and therefore is under natural selection by insect herbivores, a common garden experiment was conducted using the plant species *Passiflora incarnata*. Furthermore, a second experiment looking into *Agraulis vanillae* (Gulf Fritillary) performance on *P. incarnata* plants from different regions of the United States was conducted. The results of the common garden experiment suggested that a relationship between cyanogenic glycoside production and fitness was unable to be determined. Furthermore, from the herbivore performance experiment, a significant interaction between toughness and cyanogenic glycoside production on female pupae weight was observed. This work provides further insight into the importance of metabolites in mediating plant-herbivore coevolutionary interactions.

Evaluating Woody Tissue in Chicken Breast Samples with X-Ray, CT, and MR Imaging – A Pilot Study

Mary Catherine Lollis, CURO Research Assistant
Dr. Mark A Haidekker, Electrical and Computer Engineering, College of Engineering

The trend to grow larger chickens has posed a problem to the quality of meat, a muscle condition known as Woody Breast. The affected muscle tissue is characterized by the presence of hardened fibers, which affect the texture and can be tough to chew. Methods are sought to help identify the affected tissue to prevent it from consumer consumption and to analyze the factors involved in the hardening of the tissue. Using x-ray imaging, computed tomography (CT), and magnetic resonance imaging (MRI), absorption values of healthy muscle tissue and woody breast were examined for significant differences. The guiding hypothesis was that there is a difference in radiological absorption between healthy and diseased tissue. Using CT, the healthy tissue was found to be in the expected range of about 45 to 60 Hounsfield units, but the woody tissue showed an approximate 18.5% decrease in density compared to healthy tissue ($P<0.01$). A lower density was also found in x-ray imaging, dependent on the density ratios between 25 and 30 kVp and 25 and 35 kVp. The trend was not statistically significant. The variability in x-ray values can be explained by the variations in sample thickness. MRI relaxation times were not found to relate to the disease, but MR images served as a visual control to eliminate low-density samples caused by fatty striations. While this pilot study established the principal benefit of dual energy imaging, a larger study is needed to obtain more representative values and to eliminate unrelated influences.

Tail Ischemia Associated with Arterial Catheters in the Coccygeal Artery: A Case Series

Daiannette Lopez, CURO Research Assistant
Dr. Jane Quandt, Small Animal Medicine and Surgery, College of Veterinary Medicine

A case series study is intended in order to detail the presence of tail ischemia as a complication after an arterial catheter has been placed on the coccygeal artery of a cat or dog prior and during surgery. The study is limited to cases presented at the College of Veterinary Medicine (CVM) at the University of Georgia. Dog and cat cases presented at the Soft Tissue Surgery service with tail necrosis and/or amputation will be reviewed to see if it was subsequent to a surgery where an arterial catheter was placed in the coccygeal artery. Although correlation does not indicate causation, it is possible that the arterial catheter created blood clots that could have caused the tail ischemia, which could end in amputation. Another possible cause of tail ischemia is the occlusion of blood flow to vessels near the arterial catheter, or proximal to it, due to the catheter's size. The standard gauge of the catheter placed in the artery on the ventrum of the tail is twenty-two gauge and one-inch long. It is of importance that these cases are reported since no articles reporting cases of cat's or dog's tail ischemia caused by arterial catheters placed in the coccygeal artery have been published.

The Sustainability and Performance of Metakaolin and Blast Furnace Slag in Mass Concrete Production

Victor Lopez, CURO Research Assistant
Dr. Mi Chorzepa, Environmental, Civil, Agricultural, and Mechanical Engineering, College of Engineering

The search for sustainable concrete mixtures has been on the rise in recent times. Cement binds four other constituents together to create concrete, but is also the constituent that requires the most energy to be produced and must be manufactured separately in a cement plant. As a result, the entire concrete mixing process is unsustainable. Substituting cement with certain materials will not only produce a more sustainable mixture, but improve performance. This study involves researching viable cementitious materials, materials that exhibit properties similar to cement, and substituting a percentage of cement with these materials. The cementitious materials observed in this study are metakaolin and blast furnace slag (BFS). In terms of performance, metakaolin possesses specific qualities that contribute to long-term concrete strength as well as reduction of shrinkage, an issue involving reduced volume due to water loss. Alternatively, BFS can also replace a percentage of cement. Along with being recyclable, BFS is also used to increase concrete durability. Several concrete mixtures will be produced and tested for strength and durability, then compared to control specimens. 9 tests will be conducted on the specimens. Stength tests include Compression, Split Tension, Modulus of Rupture (MOR), and Modulus of Elasticity (MOE), and durability tests include Rapid Chloride Permeability (RCP), Alkali-Silica Reaction (ASR), Dry Shrinkage, Sulfate Resistance, and Coefficient of Thermal Expansion (CTE). These tests will determine the benefits of these cementitious materials based on environmental impact and performance.

Investigating Diet and Stress in Medieval Polish Individuals Using the Bone Density Fractionation Method

Janae Marie Lunsford, CURO Research Assistant
Dr. Laurie Reitsema, Anthropology, Franklin College of Arts and Sciences

Stable isotope analysis is well-established method for reconstructing diet and stress in past populations. However, the relative inertness of bone presents a challenge for reconstructing diet and stress during the last years and months of life. The bone density fractionation method offers a means to overcome this problem. As it allows one to see the changes in diet and stress over time in a person's life, the bone density fractionation method was used in order to better understand the diet and stress of a Medieval Polish sample. Using the ribs of three Medieval Polish adults and one subadult, the cortical bone was separated into different densities prior to undergoing stable carbon and nitrogen isotope ratio analysis. Stable isotope ratios of carbon can show whether or not a person was eating more C3 or C4 plants. Stable isotope ratios of nitrogen can demonstrate where a person was eating on the food chain and can

signal weaning in subadults. Through stable isotope analysis of the different densities, one can reconstruct patterns in diet and nutritional stress in the final years and months prior to death in adults and can test for patterns of weaning in subadults. This research allowed the application of the bone density fractionation method to a Medieval Polish sample in order to explore the changes in health and stress in those individuals until their deaths.

Forensically Influential Beetle Fauna in the Fall of 2016

Alexandria Lushaj, CURO Research Assistant
Dr. Marianne Shockley, Entomology, College of Agricultural and Environmental Sciences

What beetle fauna colonize carrion in the fall, and at what stage of decay do we find each of the different beetle families? Forensic entomology is very influential in urban and criminal court cases. Insects are the keys to unlocking hidden truths behind investigations that may otherwise not be discovered without their aid. Unfortunately, there is not much information about beetle fauna found in Georgia and much of the south so that is why the interest in conducting this experiment is so great and influential. For my experiment, I will be examining beetle fauna that colonize carrion during the fall of 2016. The point of this research is to compare what I and several other researchers collected in the spring of 2016. The continuation of this experiment is crucial in creating a substantial and solid database. The trial conducted in the spring of 2016 was very successful and helped guide the continuation of research on beetle fauna in the fall of 2016. As mentioned, there has not been much exploration behind beetle fauna research and its importance. The science we will uncover will aid investigators in estimating a post-mortem interval in potential homicide cases. In starting my quest in my experiment, a pig that is killed by a single gunshot to the head will be obtained. Next, the pig will be placed in a cage to be protected by scavengers. After the stimulation of a crime scene, pitfall traps will be placed around the cage to obtain the beetle fauna necessary to properly examine. The data from spring 2016 will be used as a comparison so a clear correlation and trend is visible.

Mechanical Characterization of Lipid Membranes Using Micropipette Aspiration

Katherine MacManus, CURO Research Assistant
Dr. Eric Freeman, Environmental, Civil, Agricultural, and Mechanical Engineering, College of Engineering

The study of the mechanical properties of liposomes will provide further insight to cell membrane fusion events such as endocytosis and exocytosis. The purpose of this experiment is to measure the mechanical characteristics of liposome membranes by using the micropipette suction technique. With this technique, data will be collected that can measure the membrane area expansion modulus and the in-plane Young's modulus, allowing for the mechanical characterization of the liposomes. The experiment is divided into two parts: the creation of the liposomes through electroformation, and the study of their membrane properties using a pressure clamp. The pressure clamp allows for the aspiration of the electroformed liposomes within a micropipette through maintaining a holding pressure. The data collected from the pressure clamp is then combined with the measured curvature of the deformed liposome using a MATLAB script, and the membrane resistance to mechanical deformation is calculated. This technique can be used for various kinds of lipids, developing the knowledge and understanding of the complex structures and properties of the lipid membrane.

A Correlational Study: The Relationship between Critical Flicker Fusion Thresholds of Postpartum Women and Infants

Neha Arun Madangarli
Dr. Janet Frick, Psychology, Franklin College of Arts and Sciences

Macular pigment, found in the center of the retina, is composed of the carotenoids lutein (L), zeaxanthin (Z), and meso-zeaxanthin. Studies by Hammond, Bovier, and Renzi (2013) and by Hammond and Renzi (2010) have shown that macular pigment optical density (MPOD) correlates negatively with visual motor response times (shorter response times indicate better performance) and positively with visual temporal

processing speed, quantified via measurement of critical flicker fusion thresholds (CFF), in adults. CFF thresholds represent the fastest frequency of a flickering light that an individual can discriminate as flickering; lights flickering at speeds above an individual's CFF will appear solid. The present study investigates the relationship between the MPOD of 20 postpartum women and the CFF thresholds of their 4.5-month-old infants. Customized heterochromatic flicker photometry was used to test the women's MPOD with a 1° 460nm and 570nm stimulus flickering in counter phase. Infant CFF was measured using a forced-choice preferential looking (FPL) paradigm in which the infant was presented with two stimuli (one solid and one flickering at a particular frequency) on either side of their midline and a naïve observer judged the side with the flickering stimulus based on the infant's looking behavior. This was repeated until a threshold estimation could be made by the second experimenter. Based on the previous research outlined above, it was hypothesized that the MPOD of postpartum women would positively correlate with their 4.5-month-old infants' CFF thresholds, meaning that women with higher MPOD should have infants with faster visual temporal processing speeds. Data collection is ongoing.

Effect of Invasive Macroalgae *Gracilaria vermiculophylla* on Feeding Behavior of *Callinectes sapidus*

Katie Maddox, CURO Summer Fellow
Dr. James E Byers, Ecology, Odum School of Ecology

Within the past decade the invasion of southeastern estuaries by a non-native seaweed, *Gracilaria vermiculophylla*, has greatly altered the physical structure of previously bare mudflats. With the creation of novel habitat, this invader could have major impacts on the trophic relationships of Georgia's estuarine communities. *Callinectes sapidus*, or the Atlantic blue crab, is a common intermediate predator found on the mudflats along the southeastern United States. Blue crabs feed on a wide range of invertebrates such as worms and clams, which are some of the species that proliferate in mudflats where *G. vermiculophylla* is often present. My study aims to quantify the effect of the emergence of this landscape-altering seaweed on the foraging behavior of *C. sapidus*. To study this effect, I conducted feeding trials in which *C. sapidus* had the option of feeding in the presence or absence of *G. vermiculophylla*. We found that blue crabs showed no preference for foraging in areas with *G. vermiculophylla* versus without the invasive seaweed. A tethering experiment was conducted in order to study predation on the mudflats. We quantified the foraging pressure on *Mercenaria mercenaria*, a clam commonly found on the mudflats where *G. vermiculophylla* is present. Again, we found that there was no significant difference in foraging pressure within *G. vermiculophylla* mats versus on bare mudflats. We also conducted a long-term predator exclusion experiment to quantify the effect *G. vermiculophylla* has on invertebrate diversity. We expect our results to show that *G. vermiculophylla* has no effect on invertebrate diversity.

The Effect of ePortfolio Use on Real-World Application of Classroom Skills

Carter Patrick Maguire III
Dr. Leslie Gordon, Institute of Higher Education, Senior Vice President of Academic Affairs

The introductory linguistics class is often more difficult than students expect, due in large part to its emphasis on active analysis of language over simple memorization of facts. Under the experiential pedagogy of ePortfolio, the abstract concepts students encounter become more accessible. Undertaken in an introductory Spanish linguistics class, the project studied the implementation of ePortfolio, a web-based collection of student work and reflections that provides evidence of learning. The ePortfolio is a unique way for students to personalize learning, encouraging the application of concepts and skills outside of the classroom. Two Honors students were used as peer tutors, reviewers of ePortfolio construction, and collectors of formative classroom data on the project's effectiveness. Three surveys taken at the beginning, middle, and end of the semester gauged variables such as the effectiveness of peer tutoring and the pace of progress through the assignment, among others. The two Honors students wrote blogs describing the experience of acting as a peer tutor, and provided accounts of the project from the student perspective. The data from the surveys and the

Honors students' blogs demonstrate that students engaged in critical observation of language use and applied course concepts to these observations. Analysis of the project shows that one semester of ePortfolio use increases the likelihood that students will apply course concepts to their observations of real world language use.

Effect of Polarization on Hierarchies of Committee-Representative Networks: Social Network Analysis

Emily Maloney, Foundation Fellow
Dr. Dawn T Robinson, Sociology, Franklin College of Arts and Sciences

The dramatic increase in party polarization within the United States Congress over the past decade has logically been linked to the government shutdown in 2012, general gridlock, increased filibustering, and an overall decline in productivity. The mechanism by which polarization plays out within US legislative bodies may be the practice of "rewarding" partisan members of Congress with preferential committee positions, because this allows the majority party to design and prioritize influential ideological legislation. Since committees originate new legislation, they are substantial actors in the production of new laws that guide the nation. This research aims to answer the question, "Does polarization and majority party control in state Houses of Representatives have an effect on the hierarchy and extremism of committee-Representative networks?" To analyze this question, datasets of Representative – Committee relationships will be constructed, along with matrices of roll call voting data. Next, a myriad of social network analysis methods will be conducted on this data, such as centrality to identify key legislators, singular value decomposition to measure partisanship, and hierarchical clustering to show cohesive subgroups. The research questions answered through this analysis are important because they can explain how polarization of parties has affected the structure of state legislative bodies and thus legislation produced, and it can begin to identify the link between polarization of parties and intentional actions in order to maintain power within the legislative body.

Local Perceptions of Wildlife in Samburu, Kenya

Erin Malsbury
Dr. Vanessa Ezenwa, Ecology, Odum School of Ecology

Wildlife conservation initiatives, guided by threat classification systems such as the IUCN red list, often focus their work on rare species with a high risk of extinction. These threat classifications are largely produced by international organizations that may be geographically and culturally distant from the area of implementation. Local people, who are critical to the success of conservation programs, may have different perceptions of wildlife in their region, and disconnect between local communities and conservation organizations has been implicated as a factor in conservation success. Thus, to improve conservation initiatives, it is imperative to understand local human-wildlife relationships and the level of awareness surrounding endangered wildlife. We conducted one-on-one interviews with members of communities in Samburu, a northern region of Kenya which harbors 51 species of large and mid-sized mammals, many of which are threatened, in order to assess local perceptions of wildlife abundance and diversity, extinction threats, and why people believe wildlife should be valued. Our results indicate that people are more likely to care about a species if it is rare but generally lack awareness about the rarity of Samburu's wildlife. Almost all participants indicated that wildlife abundance and diversity have decreased over their lifetime; however, the majority of interviewees felt that extinction is not possible. This view was largely attributed to the protection of local wildlife by recently established community-led conservancies. These results have implications for the design of conservation narratives.

The Effectiveness of Music Therapy Techniques for Improving Second Language Acquisition in Adult ESL Students

Aisling Mohini Manison, CURO Research Assistant
Dr. John Roy Kennedy, Music, Hugh Hodgson School of Music, Franklin College of Arts and Sciences

ESL teachers are always exploring creative methods for increasing second language acquisition (SLA) in their students. Music has long been recognized as a close relative of language and an effective tool for teaching. However, while music is frequently used in elementary schools, it is less popular with adults, who struggle the most with language learning. Is music just play? Or can it be just as useful for adults? The purpose of this study is to investigate the effectiveness of music therapy techniques for SLA compared with traditional classroom methods alone. Participants will be composed of adult non-native speakers with starting L2 acquisition levels spanning early beginner to mid-intermediate. The control group will be taught with traditional ESL classroom methods, while the experimental group will receive 30 minutes of supplemental instruction with music therapy techniques at the end of their traditional class once per week. Each group will take the BEST Literacy test and a Writing/Story Retelling checklist as a pre- and post-test at the beginning and end of the study. It is anticipated that students who receive music as a supplemental portion of their ESL classes will progress more quickly through their ESL levels than students without supplemental music. This study is especially significant for ESL programs whose funding is determined by their retention and graduation of students the program. In accord with Krashen's hypotheses, music therapy techniques can facilitate and expedite SLA, development of fluency, and overcoming student's affective filters by making the learning experience more authentic and enjoyable.

The Effects of Salinity on *Helianthus*

Grace Manning
Dr. Lisa Donovan, Plant Biology, Franklin College of Arts and Sciences

Food scarcity has become a growing problem as the Earth's population increases while global food production has remained relatively stagnant. In addition to this, the locations where population growth is projected to be largest are also the parts of the world that are expected to be influenced greatest by climate change. A major effect of climate change is drought along with rising seawaters. These changes will have an adverse effect on soil salinization and agriculture production. In this experiment we will be assessing the effects of salinity on 11 genotypes of *Helianthus*. Each of these genotypes will be undergoing four treatments 0mM NaCl, 100mM NaCl, 200mM NaCl and 300mM NaCl, where the treatment will initially start at 0mM and will be slowly ramped up over the course of 30 days to their final concentrations. Plants of each genotype will be harvested at the 10, 20 and 30-day marks of treatment and will be analyzed for relative growth rate (RGR), dry biomass (roots, stems and leaves), as well as the ion concentration in the leaves. We have two hypotheses: If the plant has been previously found to have salinity tolerance there will be a higher ion concentration in the leaves at higher salinity concentrations than there will be in the less tolerant genotypes; and there will be a maximum limit for the ion concentration, which will be higher in the genotypes that are previously found to be tolerant and lower in the susceptible genotypes.

Decoding Higher-Order Relations in Biological Data by Learning Markov Networks

Aaron Martinez
Dr. Liming Cai, Computer Science, Franklin College of Arts and Sciences

With the exponential growth of the amount of biological data, there is a rapidly growing need for machine learning and data mining methods that can comb through massive data repositories to answer important biomedical research questions. In particular, learning of Markov networks is viable for discovery of correlations and causality networks among biomedical entities/processes based on observed phenomena/data. The central task of learning is to compute the optimal topology of such networks through optimization computation of the joint probability distribution function, a task that in general is computationally intractable. However, recent breakthrough by the RNA Informatics Lab at UGA proves that Markov networks for tree-like (i.e., k-tree) topologies can be learned efficiently from biological sequence data, leading to successful applications such as bio-molecular structure prediction. Based on this work, the current project is progressing toward the goal of decoding higher-order relationships crossing two or more molecules with significant applications, for example, in RNA-RNA and RNA-protein 3D

structure complex predictions. Specifically, we have developed two optimization algorithms for Markov k-tree learning, for variable k, on both one and two-backbone graphs. The algorithms, which were implemented into software packages OSkT1 and OSkT2 in Java language, have already been applied to Markov network learning from miRNA-target duplex data, which can be effectively used for miRNA target prediction. To make the software scalable to larger biological sequences, our on-going research is improving the computation efficiency, including deploying the packages on parallel computers.

Bone Characterization in the Treatment of Hypophosphatasia with Mesenchymal Stem Cells

Ana Maslesa, CURO Research Assistant
Dr. Luke Mortensen, Animal and Dairy Science, College of Agricultural and Environmental Sciences

We present the use of second-harmonic generation (SHG) images produced by two-photon microscopy to characterize bone morphology using Hypophosphatasia (HPP) as a model. Hypophosphatasia (HPP) is a rare genetic disorder caused by mutations to the tissue-non-specific alkaline phosphatase (ALP) gene. Diminished ALP activity prevents the enzyme from dephosphorylating inorganic pyrophosphate (PP_i), a potent inhibitor of mineralization, resulting in disarticulated collagen and porous bones. Current treatments only alleviate symptoms in the long bones of patients with HPP and do not address premature loss of teeth and craniosynostosis. A promising treatment is mesenchymal stem cell (MSC) therapy, which has been used in clinical studies along with myeloablation and full bone marrow transplants. However, many patients in need do not qualify for bone marrow transplants as they are too sick for such a harsh, risky procedure. The impact of MSCs on bone structure has yet to be described due to the limitations of current technologies, microCT and DEXA. Image J will be used to analyze characteristics of bone such as pore size, number, and spacing along with collagen fiber density. We will use SHG images to examine the collagen microstructure in cranial bones to assess the impact of MSCs in their local environment. We predict that bones will have smaller, fewer pores and denser collagen fibers when the mouse is treated with MSC therapy. This data will be used to determine the effectiveness of MSC therapy for HPP and will establish SHG as a means for characterizing bone morphology for bone diseases.

Is Serum Bacteria-Killing Ability in the African Bush Rat Driven by Complement?

Isabella Mateu
Dr. Vanessa Ezenwa, Ecology, Odum School of Ecology

Vertebrate innate immunity provides a rapid and nonspecific response to invading pathogens. This form of immunity consists of anatomical barriers, phagocytes, natural antibodies, and opsonizing proteins. The complement system is a vital component of the innate immune response. Its enzyme cascade lyses targeted pathogen cells through either direct-attack or by marking them for subsequent phagocytosis. Previous work has suggested that wild African bush rat (*Aethomys spp.*) possess a highly robust innate immune response that destroys pathogenic bacteria significantly more effectively than the response of laboratory mice. The primary objective of this project is to test whether complement activity plays a key role in driving this robust response. To explore this issue, the bacteria (*E. coli*) killing ability of bush rat serum exposed to the complement inhibitor, 6-amidino-2-naphthyl p-guanidinobenzoate dimethanesulfonate (futhan) will be compared against untreated and heat-inactivated serum. We anticipate that, if complement is the major driver of bacteria killing in bush rats, that the futhan and heat-treated samples will exhibit very low killing compared to untreated samples, due to the inactivation of complement in these samples. This study will provide insight into precisely which aspect of innate immunity wild bush rats use to fight off bacterial infection.

Perceived Severity of Conditions Related to Obstructive Sleep Apnea among At-Risk College Students: Consequences That May Influence Academic Performance

Jamarcus Gregory Mathis, CURO Honors Scholar, CURO Research Assistant

Dr. Matthew Lee Smith, Health Promotion and Behavior, College of Public Health

Obstructive sleep apnea (OSA) is a condition that typically impacts middle-aged and older adults. However, with the rise in obesity nationwide, OSA and other forms of disordered breathing are increasing among younger populations. The ramifications of OSA among college-aged students may impact their academic performance due to inadequate oxygen intake and reduced sleep quality. The purposes of this study were to: identify familial risk factors for OSA among at-risk college students; and compare severity perceptions about OSA-related conditions that may influence academic performance. An internet-delivered survey was used to collect data from 334 overweight (57.5%) and obese (42.5%) college students who snored. Pearson correlations were performed to assess the strength and direction of severity perception associations between OSA-related conditions. Then, a series of paired *t*-tests were used to compare perceived severity levels between OSA-related conditions. Compared to overweight participants, obese participants reported their mothers had significantly more OSA-related risk factors. On average, the OSA-related conditions perceived to be most severe was cardiovascular disease (CVD) followed by depression, decreased memory, decreased concentration, daytime sleepiness, and low sex drive. Strong positive correlations were observed between the majority of severity perceptions about OSA-related conditions ($P<0.01$). In paired *t*-tests, severity perceptions were consistent for overweight and obese participants. On average, CVD and depression were perceived to be significantly more severe than other OSA-related conditions ($P<0.01$). Understanding at-risk college students' OSA-related severity perceptions can inform interventions about the importance of OSA screening and obtaining one's family health history.

Bioactive Scaffold Design for Bone Tissue Engineering

Ridge Maxson, CURO Research Assistant
Dr. Cheryl Gomillion, Chemical, Materials, and Biomedical Engineering, College of Engineering

A significant number of bone grafting procedures are performed annually in the United States. Autografts and allografts have historically been used to repair fractured bone; however, they present myriad complications, including limited tissue availability and rejection of allograft donor tissues. Advances in tissue engineering hold the promise of providing an improved mode of treatment that will expedite the formation of new bone and eliminate the possibility of rejection. Biomaterial scaffolds provide the foundational support for cell attachment and subsequent tissue formation, and are therefore a key area of interest in tissue engineering. In this work, we aimed to fabricate polymer scaffolds to include a combination of natural and bioactive molecules, and then assess various formulations to identify the optimal bone supporting scaffold. Scaffolds were fabricated using poly (lactic-co-glycolic) acid) (PLGA), a synthetic biodegradable copolymer consisting of lactic and glycolic acid. Varying combinations of tricalcium phosphate, a ceramic component associated with osteoconductivity, was blended with the polymer to improve the mechanical strength and cell supporting potential of these scaffolds. Scaffolds were prepared using a porogen leaching method, and characterized using a variety of techniques, including mechanical testing, in vitro degradation tests, and swelling studies. In addition, an in vitro cell study to examine the interaction of bone cells with these materials was used to evaluate bone cell attachment, proliferation, and mineralization. The long-term goal of this work is to develop a composite, multi-functional scaffold that addresses current limitations, mimics the properties of native bone, and supports the creation of new bone.

Communicating the Importance of Microbial Symbionts to the Public

Johnathan Martin Mayfield, CURO Research Assistant
Dr. Gaelen Burke, Entomology, College of Agricultural and Environmental Sciences

Spanning across the eastern seaboard from Maine to our own state of Georgia are Hemlocks (*Tsuga canadensis* and *T. caroliniana*) as well as the invasive and destructive sap-feeding insect Hemlock Woolly Adelgid (HWA). The successful management of this species will require the public

and its support as well as continued research by professionals into both management policies and the basic biology of the HWA. The University's mission, "to teach, to serve, and to inquire into the nature of things," serves as the foundation for this research project that aims to understand the interplay between adelgid life cycles and their microbial symbionts, and how to relay this to the public. We intend to survey community members in Athens-Clarke County about their knowledge of adelgids, their life cycles, and their symbionts before and after a program designed to simulate aspects of and increase understanding of HWA biology. Specifically, we have designed an activity to demonstrate the life cycles of adelgids and the importance of the nutritional benefits that their microbial symbionts provide. Anticipated results include increased expressed appreciation for research on insects and their impact upon the environment. Furthermore, we intend to publish the activity and other resources online for use by educators outside of the UGA community. Through our various outreach methods we believe that we can both inform the public about a research project being actively conducted in the Entomology department at UGA and the impact of adelgids and other invasive insect pests upon our environment.

Primordial Chemical Composition Through the Reionization Period

Ryan McArdle
Dr. Phillip C Stancil, Physics and Astronomy, Franklin College of Arts and Sciences

The focus of this research is to model and explore the chemical evolution of the primordial universe, from the Big Bang through the reionization period. We use code developed by Christopher Gay for his dissertation, which models the chemistry of the universe from its beginnings through the recombination period under the effect of the CMBR. The goal of our project is to further develop this code in order to extend the model through the end of the reionization period, in which primordial gas clouds collapse into the first stars and radiate their surroundings. The radiation released by the newly formed stars results in a shift in compositional evolution that differs from the evolution produced by the CMBR alone, and an accurate modeling of the influence of these stars is necessary for a proper model of chemical composition through the early period of the universe. Our current model provides data that largely indicates a dying out of activity following the recombination period, in which the abundances of the different compounds remain at rather stagnant values. However, with an appropriate model of stellar influence, one would expect another period of compositional evolution to coincide with the existence of these primordial stars, and we hope to accurately model these changes in development.

Improved Nitric Oxide-Releasing Polymer with Surface Exposed and Crosslinked Zwitterionic Polymer for Antimicrobial Applications

Jennifer McCarty, CURO Research Assistant
Dr. Hitesh Handa, Chemical, Materials, and Biomedical Engineering, College of Engineering

Accumulation of bacteria, proteins, and platelets on medical device surfaces is a leading cause of nosocomial infections and device failure. If this fouling of medical device coatings could be eliminated, then the safety of implantations, catheters, and stents would increase exponentially. By applying a zwitterionic polymer topcoat (antifouling agent) to a nitric oxide (antimicrobial agent) releasing medical grade polymer, we can dramatically decrease protein adhesion and reduce bacterial attachment synchronously. The zwitterionic polymer (2-methacryloyloxyethl phosphorylcholine- co-benzophenone, BPMPC) was tested for protein adhesion by analyzing its surface properties using ellipsometry and contact angle measurements. This zwitterionic polymer was then crosslinked to the surface of the NO releasing polymer that contains NO donor molecules. The test samples containing the NO donor with the zwitterionic topcoat were tested for NO release behavior to ensure sustained drug release. This combination was tested with *Staphylococcus aureus*, a common pathogen detected in nosocomial infections, for its antimicrobial efficacy. This study aimed to prove that a zwitterionic antifouling topcoat, when paired with a nitric oxide donor, could significantly decrease microbial adhesion. This coating has significant antifouling benefits, allowing for many applications in the biomedical field.

Insects as a Nutritional Source in Horse Feed

Jacki McCollum, CURO Research Assistant
Dr. Marianne Shockley, Entomology, College of Agricultural and Environmental Sciences

There has been a rise in Entomophagy lately as it is a more sustainable food source for both people and animals. It is both nutritional and sustainable, so I decided to research insects as a feed source for horses. I set out to find, based on what is already known, if the nutritional content in insects seems to correlate with what horses need in their diets, and also what people who buy horse feed would think of such a feed. I began by getting as much information as I could about the nutritional needs of horses compared to the nutritional content that insects contain. This proved to be difficult, as I found that insects as a food source for horses has not been studied before, but based on what is known, insects should be able to fill many nutritional requirements of horses. After drawing conclusions from my findings, I created a survey that I have sent out to people that ride horses in order to understand what the public's opinion on such a feed would be. Based on the responses, the people that buy horse feed would be open to trying an insect based feed if it were proven to be beneficial to the horse.

The Conservation of Allostery in *C. Elegans* UDP-Glucose Dehydrogenase

Weston Ellis McDonald, CURO Research Assistant
Dr. Zachary Wood, Biochemistry and Molecular Biology, Franklin College of Arts and Sciences

The human enzyme UDP-Glucose Dehydrogenase (hUGDH) catalyzes the NAD+ - dependent reaction of UDP-Glucose to UDP-Glucuronic acid. The product is essential to glucuronidation, a detoxification pathway of drugs in the human body. This process enhances the rate at which drugs are excreted, and leads to many drugs failing clinical trials. hUGDH catalysis is dependent on its hexameric structure, which is allosterically regulated by a downstream feedback inhibitor, UDP-Xylose. The binding of UDP-Xylose in the active site induces the formation of a distinct inactive conformation of the enzyme through the translation of a conserved allosteric switch. Identifying ways to inhibit UGDH by studying the evolution of this switch and the cavities it occupies could provide ways to influence glucuronidation. Bioinformatics studies identified *C. elegans* UGDH (cUGDH) to be one of the more divergent versions of UGDH that still conserve the allosteric switch. Structural studies with cUGDH show that UDP-Xylose induces the same conformational change in the enzyme. Sedimentation velocity studies show that UDP-Xylose stabilizes the cUGDH hexamer in solution. These results suggest that the allosteric mechanism is preserved between the divergent enzymes. However, steady-state kinetic studies show that the affinity for UDP-Xylose in cUGDH is reduced by more than an order of magnitude. Future studies will aim at solving which structural changes in the functional allosteric switch causes a lesser affinity in cUGDH. I am currently refining the X-Ray crystallographic data of UDP-Xylose-bound cUGDH, and will overlay the refined structure to discover any observable differences.

Rapid Control of New Infections with *Trypanosoma cruzi* in Previously Infected Mice

Caroline McElhannon
Dr. Rick Tarleton, Cellular Biology, Franklin College of Arts and Sciences

Chagas disease, caused by infection of the protozoan parasite *Trypanosoma cruzi*, remains the leading cause of human congestive heart failure worldwide. Particularly prevalent in South America, recognition and treatment are limited, and prevention relies primarily on control of the insect vector. In this study, whole mouse imaging and transgenic parasites expressing luciferase were used to monitor control of parasites at the initial site of infection. Unsurprisingly, previously infected mice controlled skin-introduced parasites more effectively than naïve animals. Mice with a chronic infection, though, had significantly greater control of reinfection than mice with an active acute infection. Additionally, this control in chronically infected mice occurred much faster than expected: within 3-4 days post-challenge. This result suggests that a resident population of T cells may be providing early recognition of challenge parasites. However, experiments to test the requirement for resident memory T cells in this rapid control have so far not supported this

hypothesis, and attempts to transfer this phenotype through T cells of chronically infected mice have failed. This early control also does not appear to be dependent on type I interferon, as mice lacking type I IFN receptors exhibit the same patterns as wild-type mice. Future experiments will use T cell depleting and migration inhibiting treatments to determine the role of non-tissue-resident T cells in the very early control of *T. cruzi* infection in chronically infected mice. These results and future studies will inform on mechanisms that may be required for effective vaccination against *T. cruzi* infection.

Fluidity of Identity among Older Gay Men

Maddie McGarrah, CURO Research Assistant
Jacklyn J Byrd
Dr. Denise Clark Lewis, Child and Family Development, College of Family and Consumer Sciences

Using case study analysis, we will explore how two cisgender gay men reach their decision to "come out," revealing their sexual identity. Otis and Harley (2016) propose that identity is constructed by three fundamental components. Identity is (1) socially constructed, (2) fluid, and (3) continuously evolving through social interaction and meaning-making. Using these three components, we consider various individual factors that form one's identity in later life. Possible factors include age, social & community support and values, as well as race or ethnicity. We recognize that it is not feasible to generalize findings from singular case studies to an entire population; however, case study analysis allows us to identify and generalize theoretical positions. In addition to our findings, we will also discuss whether factors identified in these case studies coincide with broader LGBT literature, particularly addressing additional contributing factors in accepting or rejecting one's sexual identity and the pathways that lead these men to revealing their identity to those around them.

Endurance Training in Patients with Friedrich's Ataxia

Nicole McGarrell, CURO Research Assistant
Dr. Kevin McCully, Kinesiology, College of Education

Friedrich's Ataxia (FRDA) is a rare autosomal recessive disease that results from a faulty mitochondrial protein known as Frataxin. Patients with FRDA have progressive loss of motor function. This case report evaluated muscle adaptation to neuromuscular electrical stimulation (NMES) training. A 36-year-old female with FRDA completed twelve 30-minute training sessions using NMES over 30 days. Pre and post measurements of muscle specific endurance and oxidative capacity were taken. Oxidative capacity was measured using near infrared spectroscopy and muscle specific endurance was measured using twitch stimulations and an accelerometer and recorded as an endurance index. Training sessions started with 4,200 contractions and progressed to 9,420 contractions. Muscle-specific endurance increased by 14% at 2 Hz, 17% at 4Hz, and 51% at 6 Hz. No measurable quantitative difference was observed in the patient's mitochondrial capacity. Patients with FRDA are able to be trained via NMES to improve muscle-specific endurance indicated by increases in training volume and endurance index values. It is not certain if mitochondrial capacity in these patients is able to be improved significantly within a measurable range. This study supports the use of the mitochondrial and endurance tests as a way of obtaining outcome measures for clinical trials for people with FRDA.

An Analysis of Early Vocalization Development from the Natural Environment of Two Young Children with Autism Spectrum Disorder

MacKenzie McGraw
Anna Marie Fink, Brianna Kelley, Lauren Langan , Meredith Anne Towey, Alexis Pope, Jennifer Smith, Sherry Sayavongsa
Dr. Sandie Bass-Ringdahl, Communication Sciences and Special Education, College of Education

Autism Spectrum Disorder (ASD) is a diagnosis that includes a wide range of symptoms and levels of impairment. The most common symptom that prompts parental concern is the delay in onset of spoken words, including delayed or disrupted onset of babbling (beyond the typical 6-10 months of age) and gesture usage (Baranek, 1999; Mitchell et al., 2006). Early identification and intervention

are widely recognized as critical to language development and are significant variables in the development of communication (Yoshinaga-Itano, 1998). Children with ASD who have undergone early intervention demonstrate gains in verbal and nonverbal communication, intelligence test scores, and peer interaction (Wiggins et al., 2006). Unfortunately, the diagnosis of ASD often occurs well past the first year of life often, in part, due to the failure of a child to develop spoken language. The current study is an analysis of data from two young participants with ASD. A 12-16 hour vocalization recording was collected in the home using the LENA device. The recording was analyzed to determine the degree of vocalization development and for the presence of canonical babble, a milestone for first word production. In addition, the recordings were analyzed for the presence of background noise, and its impact on each child's productions. The results of this analysis may provide insight into the early vocalizations of children with ASD thus allowing for earlier identification and intervention. The results may also have implications for maximizing learning in the home by modifying the environment.

Effects of 25-Hydroxycholecalciferol on Bone Growth and Development in Laying Pullets

Luke McGrory
Dr. Woo Kyun Kim, Poultry Sciences, College of Agricultural and Environmental Sciences

Avian osteoporosis leads to serious economic and welfare issues in the laying hen industry. Avian osteoporosis, which is very similar to osteoporosis in humans, is described as the reduced activity of osteoblasts with increased activity of osteoclasts. Osteoblasts build bone to be stronger and osteoclasts break down bone. As a result, this leads to a lack of bone density and increased fractures. In order to counteract these issues in laying hens, it is vital to promote proper bone health prior to onset of egg production. One method of fighting osteoporosis in laying hens is through the use of pro-osteogenic agents. 25-Hydroxycholecalciferol (25-OH VitD3), an intermediate of active VitD3, is hypothesized to be a more potent stimulating agent to increase bone density and prevent bone degradation in layers than normal VitD3. The main objective is to evaluate the effects of 25-OH VitD3 on laying pullets. This will be done by introducing the 25-OH VitD3 and normal VitD3 into the diets of two different groups of layers as well as a third control group. From here, bone samples will be collected and analyzed using micro-CT and UV injection dye technologies. We expect that the 25-OH VitD3 will be more effective than both the VitD3 and control groups in promoting bone growth and development. The overall goal is that this study will introduce an effective strategy in allowing for optimal egg production by reducing osteoporosis in laying hens.

A Comparison of Muslim and Jewish Cultural Impacts on Spanish Society in Relation to Punishments for Practicing These Religions during the Spanish Inquisition

Anna Kay McKenzie
Dr. Dana Bultman, Romance Languages, Franklin College of Arts and Sciences

Spanish culture displays a profound Muslim inheritance due to the Islamic kingdoms of the Iberian Peninsula that reigned from 711 to roughly 1492. This influence is seen in the architecture, language, customs, and clothes. Despite the impact on the nation, Muslims within Spain were persecuted greatly during the Spanish Inquisition, which lasted from 1478 to 1834. The persecution, which began under the reign of Ferdinand and Isabel, most famously affected Spanish Jews. The punishment mandated to Spanish Jews was much more severe than that mandated to the Muslims. Interestingly, Jews inhabited Spanish lands for much of Spain's history, yet there does not appear to be as strong a lasting cultural impact from their presence. Due to persecution during the Inquisition, many Muslims and Jews practiced crypto-Islam and crypto-Judaism, respectively. This practice entailed public devotion to Catholicism even though the new converts continued to practice their original religions secretly within their homes. Despite the secrecy, the Catholic rulers discovered these practices and began persecuting those who performed them by holding trials. By examining records of trials during the Inquisition and books discussing the cultural impacts of these minorities on Spain, I aim to find a correlation between the

impact on Spanish culture from the Jews and Muslims with regard to their relative punishment during the Inquisition. Through preliminary investigation, I believe that those who practiced crypto-Islam were persecuted less than those who practiced crypto-Judaism because of the kinds of cultural impacts each group had on Spanish society.

Climate Change and Gene Flow Rates in *Boechera stricta*

Kathryn McKibben, CURO Research Assistant
Dr. Jill Anderson, Genetics, Franklin College of Arts and Sciences

Climate change affects plant populations by altering natural selection on traits and changing the fitness values of current adaptive traits. The research investigates the evolutionary effects of climate change in plants by conducting field and lab studies of the ecological model species *Boechera strica*, a mustard plant native to the Rocky Mountains. To distinguish whether traits are caused by genetic and/or environmental factors and to determine the extent of phenotypic plasticity, we quantify traits of individuals transplanted in five common gardens at varying elevations in the Rocky Mountains. At each elevation, half of the plants were exposed to current climate conditions and the other half were exposed to early snow removal which effectively simulates future climates in this region. I have examined traits such as stomatal density, epidermal cell density, and leaf area. Extensive phenotypic plasticity was found which I will present. We are about to begin a study to determine gene flow rates across populations and ultimately to map quantitative trait loci for traits and fitness using genome-wide association studies. We predict that the amount of gene flow in the populations will not be sufficient to keep pace with climate change. We will collect data on several thousand single nucleotide polymorphisms across the genome to quantify gene flow and allelic turnover. By integrating genotypic and fitness data from the same plant families, we can predict whether gene flow facilitates adaptive response to climate change. Results of this genotyping work may not be available for the CURO presentation.

Testicular Toxicity of Bisphenol AF: Induction of Multinucleation of Spermatogonia

Emily Measel, CURO Research Assistant
Dr. John Yu, Environmental Health Science, College of Public Health

Bisphenol A (BPA) is a widely studied endocrine-disrupting chemical (EDC) due to its potential adverse effects on animals and humans. Many BPA analogs such as BPAF have been synthesized and are now used as substitutes for BPA. However, there is a paucity of information available on the effects of these substitutes on human health and the environment. Using an automated multi-parametric high-content analysis (HCA) in spermatogonial cells, we compared these effects on nuclear morphology, DNA content, cell cycle, cytoskeleton integrity, and DNA damage responses. BPAF exhibited higher testicular toxicities, especially the formation of multinucleation (MNG) of spermatogonia as compared to BPA. Induction of MNGs has been reported following gestational exposure EDC, and may link to the testicular dysgenesis syndrome (TDS). However, the molecular mechanism is still unclear. In this study, we tested the hypothesis that the formation of MNGs is due to the failure of cytokinesis after exposure to BPAF, resulting from alterations of mechantransduction pathways such as Src, p190, RhoA, lamin A/C, and LINC complex. Dose and time-dependent alterations of these proteins were examined using Western blot analysis. Furthermore, we developed a single cell based HCA to examine the temporal and dose-dependent alteration of protein expression of lamins, LINC complex components SUN1, SUN2, as well as p190. We found alterations of lamin A/C and p190 were associated with nuclear morphology, cell cycle progression, and cytoskeleton integrity. Understanding the mode of action of BPAF induced MNGs will provide essential information for the risk assessment for the safety of the public.

Admit One: Analyzing the Myriad Pathways into the Design Industry

Reilly Megee, Foundation Fellow, CURO Research Assistant
John Weatherford, New Media Institute, Grady College of Journalism and Mass Communication

This research will dive into the ever-evolving industry of design. In today's professional climate, design is becoming increasingly recognized as pivotal, as efficiency and aesthetics become paramount to survival in the business world. As all eyes turn towards design, the field and the people within it are being put under the microscope. This research will examine how design professionals, with their myriad skills and backgrounds, find their way into the industry. It will focus on the path designers take to enter the field and the challenges they face while doing so. How do people become aware of different design-centric career paths, and how do they know when or how to choose those paths? In addition, this research will look into whether the gender, race, and sexual orientation of designers present additional challenges to entering the field. Primarily, data will be gained through in-depth interviews with current design professionals. This data will be analyzed, supplemented with outside data, and presented in a public, online format. In examining this topic, this research hopes to uncover places where design education and awareness could be improved, including, but not limited to, secondary education, higher learning, and specific geographic areas of the US. It contends that there are large gaps in education and awareness about design-based careers and seeks to draw attention to this deficiency, should one be found.

Trait Activation Theory and Academic Performance: Does Academic Major Moderate the Relationship between Personality and Academic Performance

Arturia T Melson-Silimon, CURO Research Assistant
Dr. Nathan Carter, Psychology, Franklin College of Arts and Sciences

Within the field of personality psychology, researchers have long been engaged in the debate regarding the relative influence of personal attributes and situational features on human behavior known as the "person-situation debate." In recent years, interactionist perspectives such as trait activation theory (TAT) have been suggested as a possible solution to this debate. TAT posits that situational cues serve to strengthen or weaken the influence of personality on behavior. TAT has been mostly explored in the workplace, but seen little attention in the academic setting. The purpose of this study is to explore TAT in academic settings by studying how the situational cues associated with one's major influences the relationship between personality and academic performance. It is predicted that the relationship between personality and academic performance, as measured by GPA in the major, will depend on the correspondence between the cues by different academic majors and the personality trait studied. For example, although openness to experience may have little influence on performance in engineering courses, it may have strong influence on performance in visual arts. To test this hypothesis, 300 undergraduates of various majors will be randomly selected to participate in this study. Participants will complete an online self-report survey measuring personality and academic performance. Regression analyses will be conducted to evaluate the relationship between personality and academic achievement by major. Results of this study will further advance the field by leading to a better understanding of the relationship between personality and academic achievement.

Glycome Profiling of Medaka Exposed to Chronic, Low Level Ionization Radiation

Olivia Mendel
Dr. Carl Bergmann, Biochemistry and Molecular Biology, Franklin College of Arts and Sciences

Within the United States there are over 1000 locations that are contaminated with radiation. Although this ionizing radiation (IR) can have beneficial applications, the long-term health implications are still unknown. Using medaka fish as the model organism, the overall aims of the project are to quantify proteomic and glycomic responses of medaka across varying levels of chronic doses of IR. This project focuses specifically on N-linked glycosylation in the intestines of medaka. N-linked glycosylation occurs through a highly conserved process, and affects many properties of proteins including conformation, solubility, and antigenicity. N-glycans play important roles in cell signaling and the immune response. At the Savannah River Ecology Lab, medaka fish were irradiated with 0.1 mGy, 2mGy, 20mGy and 200 mGy IR for 6 months to allow for chronic accumulation. They were then dissected into carcass (including eyes

and brain), organs, and intestines. N-glycans were obtained by enzymatic hydrolysis using PNGase F followed by MALDI-TOF and ESI-MS and bioinformatic analysis. Thus far, glycome analysis has revealed significant differences in the glycan composition and abundance of the control intestine as compared to the treated samples. There are also notable differences between the glycan composition in the intestine and carcass samples. Identification of the glycan structures is still in progress. These findings will aid in elucidating the physiological responses of organisms to chronic, low dose IR.

Evaluation of Residential Basement Wall Concrete Mixtures for Water-Tightness and Reduction in Traditional Reinforcing Steel

Jake Michael, CURO Research Assistant
Dr. Stephan A Durham, Environmental, Civil, Agricultural, and Mechanical Engineering, College of Engineering

The Atlanta housing market is expected to grow 7% in total households during the next five years. With this potential economic opportunity, it is advantageous to develop innovative methods of constructing more economical homes. Ready Mix USA is interested in evaluating concrete mixtures for basement walls that provide equivalent water-tightness to that of current installation methods and have the potential to decrease the required area of temperature and shrinkage steel. The 2015 International Residential Code (IRC) requires foundation walls that retain earth and enclose interior spaces and floors below grade to be dampproofed. This study evaluated novel concrete mixtures for use in basement walls that satisfy the IRC without having to provide an exterior damproof/waterproof membrane and the novel mixture that utilized a permeability reducing admixture was found to reduce the seepage through concrete specimens. This study also examined the use of macrofibers and shrinkage reducing admixtures to potentially reduce the reinforcement required in the basement wall. This allows for a quicker and more economical installation of residential basement walls. The study was completed in three phases (1) establishing the property characteristics of novel concrete mixtures, (2) modeling and analyzing basement walls with the novel concrete mixture using Finite Element Analysis, and (3) constructing a full-scale basement wall to demonstrate the placeability of the novel concrete mixture.

Nanocellulose Based Drug Loaded Micro/Nanoparticluate for Therapeutic and Drug Fate Analysis

Betsi Micholas
Dr. Jaya Sundaram, Chemical, Materials, and Biomedical Engineering, College of Engineering

Nanoparticles provide massive advantages regarding controlled and targeted delivery with their potential to combine diagnosis and therapy, emerge as one of the major tools in nano-medicine. Curcumin has anti-cancerous and anti-inflammatory benefits, specifically for the colon. The main issue with drug delivery to the colon is that the drug often degrades in the gastrointestinal tract before reaching the colon. Encapsulation of drug into bio-based polymer is a common practice in pharmaceutical industries. Nanocellulose is classified as a biopolymer and has unique properties allowing it to be a good candidate for site-specific drug delivery through nano-encapsulation. This project is proposed to make nanocellulose encapsulated curcumin nanoparticles to have site-specific controlled delivery at the colon. Cellulose nanocrystal (CNC) was dispersed in water and used to encapsulate curcumin. A measured amount of curcumin was dissolved in the required amount of ethanol, and added slowly to CNC solution by continuously stirring the mixture. Once the mixture was homogeneous, it aged for 24 hours and curcumin encapsulated CNC particles were separated using vacuum filtration. The filtered cake was dried at low temperature in a vacuum dryer and stored for further analysis. Analysis of curcumin-loaded nanoparticles follows surface morphology analysis, physicochemical analysis, bioavailability, biodegradability and in vitro release study using artificially simulated intestinal and stomach fluids. The specific aims are to have a controlled delivery of the drug in the intestinal fluid and to increase the bioavailability of curcumin. The developed nanoceullose encapsulated curcumin will improve the current drug delivery methods of colon cancer treatments.

The Call of the Crypt Keeper: E.C. Influences in the Films of George A. Romero

Audrey Miller, CURO Research Assistant
Dr. Christopher Sieving, Theatre and Film Studies, Franklin College of Arts and Sciences

When discussing the foundations of his style, George A. Romero, like many 'Horror New Wave' directors of the 1960s and 70s, frequently and unapologetically points to the early influence of popular 1950s titles from the notorious Entertaining Comics (E.C.) over the horror films of his childhood. While this nod to comics is reasonably well documented—he felt indebted enough to direct an explicit homage in 1982's *Creepshow*—few studies have attempted any closer interpretation of the kinships between the two horror mediums. This paper will ask more explicitly what it means for a film or director to claim a distinctly comics-inspired style. Grounded in discussions of the visual, narrative, and thematic connections between E.C. stories and Romero's film texts, this paper argues that Romero's comics-inspired style, more than constituting a passing anecdote, can be precisely articulated and its functionality as a means by which Romero broke from previous cinematic horror traditions explained. This paper will further demonstrate how a film like Romero's 1968 *Night of the Living Dead*, through its more adept integration of a comics visual style into a language coherent as film, represents a more compelling application than *Creepshow*, which insistently, though arguably superficially models itself after E.C. anthology comics. Though much of the discussion surrounding film and comics is about the incommensurable differences of language that often give rise to ineffective adaptations, this paper argues that Night represents a site for considering how the two mediums can be used productively together.

Self-Assembled Chitosan Nanoparticles for Breast Cancer Therapy

Jeremy Miller
Dr. Cheryl Gomillion, Chemical, Materials, and Biomedical Engineering, College of Engineering

Breast cancer is among the most common causes of death among women in the United States, with a mortality rate slightly less than the second most common cancer, lung cancer. Typically, breast cancer therapies target hormone receptors for estrogen, progesterone, and HER2 for delivering the drugs to the tumor cells; however, triple-negative breast cancer cells lack all three receptors, and thus cannot be treated with conventional therapies. These commonly used drug therapies are unable to permeate into the tumor cells without a receptor to mediate drug uptake. To circumvent this, drugs can be loaded into nanoparticles small enough to permeate freely through the membrane without the use of the hormone receptors. Therefore, the objective of this work was to fabricate and characterize polymeric nanoparticles useful for treating these specific tumor cells. Chitosan was selected as the biopolymer of choice for this application. Chitosan, a polysaccharide derived from the deacetylation of the chitin, has multiple unique properties that make it ideal for drug delivery. Specifically, it is biocompatible, maintains antimicrobial and analgesic properties, and its positive charge allows it to act with the negative part of cells' membranes. Chitosan nanoparticles were successfully prepared via self-assembly with tripolyphosphate (TPP). Current and future work includes determining the viability of these particles as a drug delivery vehicle for cancer therapy. Fabricated particles will be characterized to assess drug loading capacity, drug encapsulation efficiency, etc. The particle shelf-life and batch reproducibility will be important factors for determining the efficacy of these particles for cancer therapy.

Refugee Health and Migration

Prabhjot K Minhas, Ramsey Scholar
Dr. Susan Tanner, Anthropology, Franklin College of Arts and Sciences

In today's globalizing world, migrant and refugee health has become an increasingly important topic in public health, medicine, and anthropology. Research suggests that understanding the backgrounds of migrants helps in the delivery of high quality healthcare. This research focuses on nutrition and health within refugee populations and is part of a larger, ongoing project designed to understand the relationship between acculturation and maternal-child health in the US. Specifically, I conducted a literature review to examine

healthcare experiences among US refugees. Research themes concerning refugee health and migration were traditional medicine, nutrition and health, obstacles to healthcare, and the effect of language and culture on the healthcare experience. The literature suggested that health and nutrition changes in resettled migrants, and the next generations, are influenced by interactions of culture, history, language, ethnicity, and social relationships. A second literature review focused on the Karen refugee community, diet, and nutrition. Overall, both literature reviews showed that much research has been conducted on diet and nutrition change among refugees and migrants; however, little has investigated refugees' and migrants' perceptions of these changes. To study the perception of food and diet changes, I have developed a set of nutrition and diet-related questions to be included in a questionnaire exploring maternal-child health. Throughout the semester, I will investigate the role of perceived quality of diet and nutrition among refugees and migrants in the Athens area. The information gathered with this research has the potential to help healthcare professionals better understand and work with patients.

Employer Expectations and Experiences of Gratitude

Molly Eleanor Minnen, CURO Research Assistant
Dr. Michelle R vanDellen, Psychology, Franklin College of Arts and Sciences

Gratitude—recognition of goodness outside the self—is a positive emotion often experienced in close relationships. Research has not yet examined how work-related traits (e.g., self-control) affect experiences of gratitude at work. We expect employers may feel more grateful when a low self-control employee performs an organizational citizenship behavior (OCB) or resists a counterproductive work behavior (CWB) than when a high self-control employee performs or resists the same behavior. In prior work, we observed employers to be habitually grateful for high self-control employees. Thus positive extra-role behaviors or resisted missteps may not produce a material increase in gratitude. When a low self-control employee exceeds expectations, employers may experience noticeably more gratitude. The goal of this study was to assess both trait and state gratitude for employees. Specifically, we examined how employers react to employee work behaviors. Participants imagined they were a supervisor in a company and were randomly assigned to read about either a high or low self-control employee. They were additionally randomly assigned to read a report of an OCB or a CWB taking place at the office. Participants learned the target employee either committed the OCB or did not commit the CWB. We assessed their reactions. We found that participants expressed more trait gratitude for high self-control employees but more state gratitude for low self-control employees. Results from this study could provide novel insight into why low self-control employees might receive more recognition for positive behaviors than high self-control employees.

Redefining the Boundaries of Healthcare Technology Policy

Simran Modi, CURO Research Assistant
Dr. R. Vincent Pohl, Economics, Terry College of Business

In recent years, the rise of healthcare technology such as mobile applications, telemedicine, and remote patient monitoring systems has become more prominent. However, the regulations that govern these devices and applications are not clear and do not serve to benefit the patient population. In 2011, Teladoc, a telemedicine company, filed a suit against a Texas Medical Board for limiting the scope of telemedicine practice. Other cases and lack of clear definition call for a meta-analysis to assess these policies. This study examines several state policies that can be expanded to the federal sphere in order to benefit the patient population. The purpose of this study is to identify policy initiatives that will provide clarity for the scope of practice and use of medical technology. The effectiveness of the healthcare technology policies will be analyzed using three criteria: cost of policy implementation, economic benefits, and expanded accessibility to healthcare. The analysis will point towards extended benefits and appropriate implementation techniques.

The Language of Leadership: Investigating Speech as a Predictor of Leadership Capacity

Amanda Moeller

Dr. Karl Kuhnert, Psychology, Franklin College of Arts and Sciences

Previous research done on leadership indicates that there are four distinct levels of leadership maturity that individuals can possess, each of which are characterized by distinct behavioral patterns, perceptions, and priorities (Kegan, 1982; 1994; Kegan & Lahey, 2009; Eigel & Kuhnert, 2016). These four Leadership Development Levels (LDLs) are appraised to individuals by multiple raters who conduct and evaluate their in-person interviews and assess according to criteria outlined by Lahey, L., Souvaine, E., Kegan, R., Goodman, R., & Felix, S. (1988). LDLs have been found to be predictive of job performance, even surpassing the predictive ability of the Big 5 personality assessment and 360-degree performance feedback ratings. (Strang & Kuhnert, 2009). Using transcribed in-person interview text as well as language and text-processing software, such as the Linguistic Inquiry and Word Count (LIWC) software developed by Pennebaker & Francis (1996) and The University of Cambridge Psychometrics Centre's Apply Magic Sauce (AMS) word processing engine, this study will aim to analyze the language of leadership by seeking out differences in speech indicative of emotional state, personal concerns and priorities, and different thinking styles between LDLs. Our sample consists of nine Fortune 50 executive leaders' transcribed interviews that span across each of the four LDLs. Each transcription ranges between 3436 and 9685 assessable words. If significant language-based differences between LDLs are found, it may result in a new quantitative method being applied to judge potential employees' leadership capacity.

Small Molecule-Stimulated MSC Adhesion to Enhance Atopic Dermatitis Therapy in Companion Animals

Adir Mohaban, CURO Research Assistant
Dr. Luke Mortensen, Animal and Dairy Science, College of Agricultural and Environmental Sciences

Decades of research have shown the potential of stem cells therapies as a remedy for chronic illnesses due to their anti-inflammatory and immunomodulation capabilities. While there is much hope for viable stem cell therapies, a major limitation can be linked to inefficient cell homing due to poor expression of surface adhesion receptors. Could surface modification of MSCs allow for more efficient homing? In a previous study, pretreating MSCs with Ro-31-8425, a molecule shown to upregulate the *CD11a* gene which codes for surface receptors, led to an increase in static adhesion to plates coated in intercellular adhesion molecule 1 (ICAM-1). ICAM-1 is expressed in increased levels by endothelial cells at sites of inflammation. In this study, we hope to expand on this by observing static and shear adhesion levels of pretreated MSCs to canine endothelial cells expressing ICAM-1. This will be accomplished by inducing shear stress over MSCs firmly adhered to endothelial cells (static adhesion) or by flowing MSCs over an endothelial cell monolayer (flowing adhesion) at measured levels of shear stress, using a syringe pump and a parallel plate flow chamber. White blood cells will be used as a positive control for comparison. We expect to observe increased adhesion of pretreated MSCs to the endothelial cells. This would indicate the possibility of using MSCs pretreated in Ro-31-8425 as a viable therapy for diseases causing inflammation, such as atopic dermatitis. We hope to move on to clinical trials with diseased canines once we determine the efficiency of pretreated MSC homing.

The Difference Between Men and Women in the Effects of Exercise on Circulating Angiogenic Cells

Sydney Michelle Mohr, CURO Research Assistant
Dr. Nathan T Jenkins, Kinesiology, College of Education

Physical activity reduces the rates of cardiovascular mortality by several mechanisms including promoting angiogenesis and increasing shear stress. Previous research has shown circulating angiogenic cells (CACs) are affected by exercise. CACs are specialized white blood cells, more specifically peripheral blood mononuclear cells (PBMCs), which can maintain vascular homeostasis, repair the injured vascular endothelium, and promote angiogenesis. We hypothesize that women, especially those in the luteal phase, will experience greater exercise induced increases in the number and function of CAC compared to men. Thus far 4 men have had

a body composition test and performed a graded maximal energy test on a stationary bike. Cell isolation and flow cytometry were performed on blood drawn from participants at baseline and post exercise. The results showed an increase in CD16+, CD14+CD16+ and CD14-CD16+ cells and a decrease in CD3+, CD14+, CD14+CD16- and CD34+ cells. The decreases in CD14+ and CD14+CD16- were expected due to their pro inflammatory affects but the other results were not. These results were inconclusive due to the small sample size and lack of women participants and will be continued in the spring.

Comparing Activity Budgets between Adult and Juvenile Asian Elephants

Nam Money, CURO Research Assistant
Dr. Vanessa Ezenwa, Ecology, Odum School of Ecology

The slow growth and development rate of Asian elephants (*Elaphus maximus*) is directly linked to the length of their lifespan, which can be as long as 70 years in the wild. This suggests that behavioral differences between juvenile and adult elephants can be very prominent. However, there has been limited research on differences in elephant behaviors based on age. In this study, the behavioral activity budgets of six semi-wild elephants were observed at the GVI Thai Elephant Project in Northern Thailand. Since half of the elephants were juveniles and the other half adults, the objective of the study was to discern if knowledge and learning causes older elephants to perform activities indicating a higher understanding of environment. This main hypothesis was tested by investigating four specific hypotheses: (1) The activity budgets of adult elephants will be less diverse than those of juvenile elephants (2) Adult elephants will be more sedentary (3) Juvenile elephants will exhibit more exploratory behaviors, and (4) Adult elephants will walk more, as they are more familiar with the area and have more experience. Behavioral differences between adult and juvenile elephants did not appear to differ significantly for any of the hypotheses. Thus, none of the hypotheses were supported by the data. By better understanding age related behavioral differences in elephants, conservation measures can be tailored to specific populations of elephants based on their ages. More thorough and comprehensive research should be conducted on this topic to better test the hypotheses.

Double-Deficit Hypothesis for Dyslexia: A Meta-Analysis

Mary Elizabeth Moody, CURO Research Assistant
Dr. Jason Nelson, Psychology, Franklin College of Arts and Sciences

Although the phonological theory of dyslexia has dominated the research literature over the past several decades, a more recent theory – the double-deficit hypothesis (DDH) – has received increased attention and has potentially significant implications for the identification and treatment of individuals with dyslexia. Three subtypes are purported within the DDH model, including a phonological deficit (PA) subtype, naming speed deficit (NS) subtype, and double-deficit (DD) subtype. The purpose of this study was to conduct a meta-analysis to determine if those with the different deficit subtypes differed in their reading skills in the way predicted by the DDH. Inclusion criteria were that studies (a) used a group design, (b) categorized groups according to the DDH subtypes, (c) compared at least two of the subtypes on a reading measure, and (d) reported statistics necessary for calculating effect size. Of the 193 studies reviewed, 22 met these criteria. The hypothesis that the DD subtype experiences more impaired reading skills than the other subtypes was confirmed. The DD subtype had lower reading skills than both the PA and NS subtypes, with effect sizes in the medium range for both comparisons. The PA subtype had lower reading accuracy than did the NS subtype, and the NS subtype had lower reading fluency than did the PA subtype. However, each of these effect sizes was in the small range. The hypotheses of the DDH were confirmed, although the effect sizes were substantial only for the hypothesis that the DD subtype has more impaired reading skills than the PA and NS subtypes.

Likely Leaders: The Influence of Big Five Personality Traits on Leadership Dynamics

Alex Moore, CURO Research Assistant
Gabrielle Moriah Richie, Carissa Urrea, Diana Enriquez, David Wyrembelski

Dr. Dorothy Carter, Psychology, Franklin College of Arts and Sciences

Leadership theorists are increasingly conceptualizing leadership as a relationship that is co-constructed as two or more people 'claim' and 'grant' influence (DeRue & Ashford, 2010). Although certain individuals may be motivated to influence others, the endorsement of followers (i.e. granting) is necessary for leadership to occur. The purpose of the present study is to test two hypotheses. First, we expect that an individual's levels of Big Five personality traits of (H1a) extraversion and (H1b) conscientiousness will positively predict the likelihood that they are granted leadership influence by their teammates. Second, we hypothesize that the Big Five trait of agreeableness (H2) will positively predict the likelihood that individuals will grant leadership to others. We test our hypotheses in a sample of 240 undergraduate participants assembled into 20 unique 12-member teams that were tasked with combining disciplinary knowledge in a complex problem-solving task. Participants responded to self-report sociometric measures of leadership claiming and granting in relation to their teammates. We test our hypotheses using a class of inferential models of network emergence called exponential random graph models, which identify key predictors of networked relationships.

The Effect of Galanin on Stress Resilience in Rats and the Relationship between Stress and Inflammation

Emily Stewart Moore, CURO Research Assistant
Dr. Philip Holmes, Psychology, Franklin College of Arts and Sciences

Galanin is a neuropeptide that modulates the actions of classic neurotransmitters in the central and peripheral nervous system. It has three G-protein coupled receptors, GALR1-GALR3, that have been shown to influence depression and anxiety disorders. Several studies have been done on galanin's effects on anxiety-like behavior in different animals, with variable findings depending on animal species, injection site, and behavioral models used. This study focuses on the effects of galanin on stress resilience in male Sprague-Dawley rats, as well as the relationship between stress and inflammation, which has been shown to induce anxiety-like behavior in animal models. Complete Freund's adjuvant (CFA) was injected into the back-left paw of rats to induce chronic inflammation in the area, then galnon, a galanin receptor agonist, was injected into the peritoneum for the following nine days. Control rats were injected with saline. Following injections, rats were exposed to stress via the forced swim test, then underwent a series of behavioral tests (sucrose preference, open field, and elevated plus maze) to test for anxiety-like behavior, exploratory behavior, and locomotor activity. Brain tissues were processed using ELISAs and HPLC for galanin and monoamine content. CFA is expected to increase anxiety-like behavior in the elevated plus maze, open field, and sucrose preference tests, while galanin is expected to block the effects of CFA. Dopamine is expected to decrease in the ventral striatum as an effect of CFA and galanin is expected to decrease in the ventral tegmental area.

Development of an Indoor Guidance System for Unmanned Aerial Vehicles with Power Industry Applications

Julian Moore, CURO Research Assistant
Dr. Zion Tse, Electrical and Computer Engineering, College of Engineering

Unmanned aerial vehicle (UAV) systems are experiencing a period of rapid growth as the constituent technologies are reaching maturity and the potential for industrial and commercial applications are arising. Conventional UAV technologies focus on outdoor large area navigation, utilizing GPS, which has proven to be less effective in enclosed environments. We aim to develop an indoor navigation system, specifically designed for these industrial applications which require custom sensing technologies to aid in pilot navigation. A custom sensing array, featuring ultrasonic transceivers used to measure displacement and a hardware angle correction system, was developed to localize drone position in an enclosed known environment and provide pilot feedback during navigation. Six subjects were recruited to pilot the drone with and without the navigation system in an enclosed room to a preset target at a known location in two cases: (1) with a clear line of sight, and (2) without line of sight. Flight duration, number of collisions, and distance from target were recorded and used to quantify performance of the navigation system. Upon using

the navigation system, subjects were able to reduce their flight duration on average by 19.7% during an obstructed line of sight, illustrating the increased ability and confidence in piloting the drone using the navigation system. This study serves to prove the potential of this device as an essential tool for indoor drone localization and commercial inspections.

Effect of Heliox through Airflow and Aerosol Deposition in Oral Airway

Miranda Moore, CURO Research Assistant
Dr. JongWon Kim, Engineering, College of Engineering

It is feasible, in principle, to treat breathing difficulty using Heliox (rather than air). The main effect of Heliox usage is to transform turbulent flows into laminar flows. Heliox (20% Oxygen, 80% Helium) has approximately five times lower kinematic viscosity. For a given inhalation velocity, the Reynolds number is five times less than air. The objective of this study is to investigate the effect of Heliox flow in an oral airway through airflow characteristics and particle deposition with an oral airway model. Specifically, one normal condition with air is simulated, and this is compared using Heliox. Lagrangian tracking models were used to simulate the respiratory airflow and aerosol dynamics. Apparent discrepancies in airflow characteristics and aerosol distributions were observed by Heliox transport. Furthermore, Heliox flow compared to airflow gave a different aerosol pattern that was clearly suggestive to treat breathing problems. For any given breathing problem, Heliox persists for different particle sizes considered, even though their detailed distributions vary. Results of this study indicate that the use of Heliox led to less particles deposition due to the intrinsic properties of the gas phase. Heliox with inhaled aerosols appears to be non-invasive enough to be a practical tool for respiratory system, which may disclose clinically relevant clues about the severity of respiratory disease.

Are Urban Birds in South Florida Reservoirs of *Salmonella spp*. for the American White Ibis (*Eudocimus albus*)?

Tyler Moore
Dr. Sonia Hernandez, Forestry, Warnell School of Forestry and Natural Resources

In the last two decades, populations of the American White Ibis (*Eudocimus albus*) have become increasingly more urbanized in South Florida. This sudden urbanization has given rise to an increase in contact between the White Ibis, various other species of urban birds, and people. Urban birds (e.g. wading birds, waterfowl) with which White Ibis come into direct, frequent contact may be reservoirs for *Salmonella spp*. and may play a role in the infection rate of white ibis. In previous studies, the prevalence rate of *Salmonella* of white ibis averaged 13%. Due to increased contact, we predict that the prevalence of *Salmonella spp*. will correlate and, as potential reservoirs, might be higher than the White Ibis. In order to discover if urbanized birds are reservoirs of *Salmonella spp*. for the American White Ibis, fecal samples were collected from waterfowl and wading birds from four urban sites in Palm Beach County, Florida. Simultaneously, we collected feces from white ibis at the same sites. *Salmonella spp*. was isolated from various species, including Muscovy ducks (*Cairina moschata*) and Mottled ducks (*Anas fulvigula*), at a prevalence of 19.1%, at four urban sites. *Salmonella* isolates were submitted to the National Veterinary Laboratory to determine serotype and strain type, allowing us to further understand the relationship between *Salmonella* isolated from ibis and other birds at these sites. Overall, understanding the mechanistic effects of wildlife interactions due to human-dominated landscapes will help us to better control our impacts on wildlife ecosystems and the spread of pathogens among them.

Development of a Novel Three-Dimensional Model to Study Breast Cancer Metastasis

Bryanna Moppins
Dr. Cheryl Gomillion, Chemical, Materials, and Biomedical Engineering, College of Engineering

The mechanism behind breast cancer metastasis, or spreading, to patient bones is poorly understood. This may be attributed to the usage of traditional two-dimensional (2D) culture surfaces to study breast cancer cells, which lack structural properties of native tissues in the body. Tissues of

the body are composed of multiple layers of cells, forming three-dimensional (3D) structures. In addition, breast cancer cells secrete signals to neighboring cells that stimulates migration to other regions of the body, so utilizing a 2D surface limits the actual amount of signaling that takes place. Therefore, we aim to study breast cancer cells on a 3D surface because they will ideally behave more closely to how they would in the body. Our 3D system for modeling breast cancer metastasis to bone will be composed of chitosan-based hydrogel scaffolds that will be modified to mimic two different tissue types (soft breast tissue and hard bone tissue). Preliminary studies to evaluate breast cancer cell viability on plain chitosan scaffolds were performed using three breast cancer cell lines of varying subtype, including MCF-7, MDA-MB-231, and HCC1806 cells. Results from the preliminary studies indicated that the chitosan-based scaffolds were able to support breast cancer cell growth. Current and future work will include development of protocols for fabricating and characterizing the composite bone scaffold consisting of varying concentrations of chitosan and calcium phosphate to help answer the question of how the degree of stiffness of bone affects tumor cell behavior.

Clay Mineral Concentration with Depth and Land Use History in the Critical Zone in Calhoun, South Carolina

Tony Moraes, CURO Research Assistant
Dr. Paul A Schroeder, Geology, Franklin College of Arts and Sciences

History of land use at the Critical Zone Observatory (CZO) in Calhoun, South Carolina has been well documented and studied. Land use, climate, biotic factors and topography all contribute to rates of chemical denudation (mass loss) and chemical weathering (mineral transformations). This comparative study contrasts clay mineral assemblages in a hardwood plot, which has not had recent anthropogenic influence, and an adjacent reforested pine plot that has been historically farmed. Methods used to characterize the soil cores taken from the respective plots include X-ray diffraction of oriented clay fraction with treatments of K-, Mg-, and Na- saturation in the air-dried, ethylene glycol (EG), and heated (100O, 330O, and 550OC) states. Based on weathering intensities, early end member minerals with little weathering are biotite and muscovite, while the other end member is thoroughly weathered kaolinite soils. Bedrock at the Calhoun Experimental Forest is Neoproterozoic gneiss, which shows a progression of micas, interlayered vermiculite, vermiculite, smectite, interlayered kaolin-smectite, and kaolin with increasing depth. In shallow depths of older profiles, kaolin-smectite interlayering should be apparent due to the long time for weathering and erosion. Smectite should be seen at greater depths of younger profiles using the same reasoning. From 240 XRD patterns of varying depths and methods, smectite interlayering begins at 40 centimeters at the hardwood site and at 100 centimeters at the pine site. This data is consistent with the predictions of where smectite interlayering should be found.

Identifying Novel CAAX Motifs Using YDJ1 as a Reporter

Michael Christian Morgan, CURO Summer Fellow
Dr. Walter K Schmidt, Biochemistry and Molecular Biology, Franklin College of Arts and Sciences

CAAX proteins are commonly involved in carcinogenesis and many are targets of therapeutic strategies. Mutations in Ras GTPase proteins- a subset of CAAX proteins- cause roughly a third of all human cancers and 95% of all pancreatic cancer. To better understand the signal transduction pathways that involve CAAX proteins, the Schmidt lab investigates the post-translational modifications (PTMs) that regulate the activities of CAAX proteins. CAAX proteins receive three distinct modifications at their C-terminus: isoprenylation, proteolysis and carboxylmethylation. Using the yeast model, the Schmidt lab has recently discovered a novel branch to the standard PTM pathway herein referred to as the shunt pathway. In this pathway, CAAX proteins complete isoprenylation but are not subsequently modified. Ydj1 is a heat-shock protein that uses the shunt pathway. This project takes advantage of Ydj1p to identify CAAX motifs that promote isoprenylation. A plasmid library encoding Ydj1 CAAX mutants was created by standard molecular biology techniques (e.g. PCR), transformed into yeast, and screened for motifs that promote isoprenylation using a Ydj1-

dependent thermotolerance growth assay; shunted motifs allow growth at high temperature. The Ydj1-endoding plasmids were isolated and sequenced, yielding 123 novel CaaX motifs that allowed for strong isoprenylation of Ydj1. Analysis of these sequences is being used to determine a set of rules that can predict isoprenylation better than current prediction methods, and to determine whether all or part of the sequences promote shunting.

An Analytical Evaluation of the Compounding Skills of Pharmacy Students

Kyana Breche' Morris
Dr. Deborah Lester Elder, Pharmaceutical and Biomedical Sciences, College of Pharmacy

According to the FDA, compounding pharmacy is a specialty in which a pharmacist "alters drug ingredients to create a medication tailored to… a patient." The American Association of Colleges of Pharmacy (ACCP) assembled a committee that offered its member institutions recommendations on their compounding curriculum. This study evaluates the compounding techniques of pharmacy students at the University of Georgia's College of Pharmacy based on the guidelines set forth by ACCP. The analysis included, second year pharmacy students (n=137) who compounded a 1mg/mL aqueous solution using salicylic acid powder, USP 99.5% purity and a 1mg/mL aqueous suspension from prepared 10mg salicylic acid tablets. After being stored at -2°C, suspension samples were thawed at room temperature and centrifuged at 5,000 RPM for 10 minutes. Solution samples were not centrifuged following thawing. To acquire the theoretical concentration of 0.01mg/mL, 0.25mL of each sample was transferred to a 25mL volumetric flask and diluted with distilled water. The dilutions were thoroughly mixed before transferring 8mL to test tubes and adding one drop of ferric nitrate reagent. Ultraviolet spectroscopy was used to determine the concentrations of each sample. Sample concentrations were compared to linear concentration curve made from a 1% salicylic acid stock solution. The results displayed that roughly 30% of students were able to compound within the deviations set by ACCP. This proves that quantitative analysis is indeed a useful way to measure the compounding skills of pharmacy students. Further continuation of this study will hopefully show that students can improve their skills over time.

Pregnancy Planning and Prevention

Andrea L Morrison, CURO Research Assistant
Dr. Kathrin F Stanger-Hall, Plant Biology, Franklin College of Arts and Sciences

Unintended pregnancies and the results of those pregnancies are important and pertinent issues in modern society. By analyzing the effectiveness of current education strategies and examining their shortcomings, researchers can improve upon those strategies in order to best prevent unintended pregnancies. The purpose of this research study is to analyze and evaluate the knowledge of UGA students regarding sexual health topics. In particular, this study focuses on the data analysis of pregnancy planning and prevention. The data were obtained via an anonymous, online survey sent out to all UGA undergraduate students in spring 2015. I quantified and analyzed all answers to the survey questions on sexual health, pregnancy prevention, and fertility awareness. The results demonstrate what information UGA students do and do not know about reproductive health, and also reflect the students' opinion on topics such as sex education and family planning. These topics are often under-discussed and under-reported for young adults, making an accurate account of their knowledge and a concrete plan for improvement difficult. This study will be a first step to changing this lack of knowledge by sharing the results with the University Health Center as well as opening a door to collaboration with the Health Center to develop educational materials.

Discovery of Foliar Endophytic Nitrogen Fixation in *Pinus palustris*

Kelsey Morton, CURO Research Assistant
Dr. Nina Wurzburger, Ecology, Odum School of Ecology

Longleaf pine (*Pinus palustris*) savannas are highly diverse ecosystems that once dominated the Southeastern United States, covering 94 million acres. The distribution of this ecosystem has been greatly reduced due to land-use change, but recent restoration efforts have increased its coverage to 4.3 million acres. Therefore, many longleaf pine

savannas are in early stages of development and require a substantial amount of nitrogen (N) to grow. Longleaf pine savannas are N-limited and known inputs of N (from herbaceous N-fixing legumes) do not account for N demand by growing pines. Here, we investigated whether longleaf pine foliage contains bacterial endophytes that fix N, and whether the rate of endophytic fixation differs across stand age and site. We collected foliage from plots along an age gradient at two sites in GA and FL. We used acetylene reduction assays on surface-sterilized foliage samples to quantify N fixation. We detected significant fixation activity in foliage from both study sites. We found that fixation rate did not differ by stand age but was greater at our FL site than our GA site. This finding suggests that heterogeneity in soil nutrients, climate, or other factors may affect the capacity of endophytes to fix N. Our future work will explore these possibilities. Endophytic N fixation is thus a newly discovered source of N to longleaf pine savannas, and determining the factors that control this biotic process will improve our resolution of the nitrogen budget of these ecosystems.

Comparing the Incomparable: A Methodological Investigation of Water Limitation Treatments

Liana Mosley, CURO Research Assistant
Dr. John Burke, Plant Biology, Franklin College of Arts and Sciences

As climate change progresses, environmental conditions will become increasingly unpredictable, burdening Earth's fragile resource supply. Agricultural crops are no exception to this trend, specifically considering the resource of water. Agricultural drought, or water limitation stress, has been shown to negatively affect crop productivity, reducing crop yield necessary for human consumption. To mediate the effects of drought, plant scientists aim to develop methods that increase water use efficiency across crop species. While there are many valid ways to implement water limitation stress in a laboratory setting, often times, results gathered utilizing one method are compared with results using a different method. To determine the comparability of water limitation methods in cultivated sunflower, we established seedlings of three diverse genotypes for 25 days followed by a 10 day water limitation stress. Water limitation was simulated with four treatments: two osmotic stresses, polyethylene glycol (PEG-6000) and salt (NaCl; 100mM), as well as a 20% maintained dry down and a three day repeated dry down, all of which were compared to a well watered control. Phenotypic results, such as above and below ground biomass, specific leaf area, and stem height and diameter, were measured. Experimentation is ongoing; however, we do expect to find significant differences in phenotypic variation across water limitation treatments that outweigh phenotypic variation by genotype. This methodological study not only highlights the issue of equating water limitation treatments, but also provides a basis for further study into the optimal design of water limitation implementation.

Updates on Current Circumscribed Interest Object Categories of Children with ASD and Accuracy of Parent Reports

Sanjida Jahan Mowla
Dr. Ashley Johnson Harrison, Educational Psychology and Institutional Technology, College of Education

The present study aims to examine previously defined categories of circumscribed interest (CI) objects among children with ASD to determine if updates are warranted. To further aid in this investigation, the study will also consider the convergent validity between parent reports of CI objects and children's gaze allocation to these objects. Seventy two CI object pictures were obtained from parents of both typically developing children and children with ASD. Using operational definitions, these objects were compared across categories of CI objects from other studies (Baron-Cohen & Wheelwright, 1999; Sasson & Touchstone, 2014; South, Ozonoff, & McMahon, 2005) and coded by multiple raters to determine whether the categories identified in past studies adequately represented the objects provided by parents in this study. Parents were asked to rate children's preferred items using a visual analogue scale. In order to establish the validity of parent reports, these ratings were compared to eye tracking data of children's gaze allocation to their ideographic CI objects. The goal of the study is to identify a more inclusive and relevant way to categorize CI objects for

children with ASD as well as establish the accuracy of parent reports of their children's CI objects.

Adaptation of a DNA Purification Protocol for 3rd Generation Sequencing of *Eimeria* Species

Adrea Mueller, CURO Honors Scholar, CURO Research Assistant
Dr. Brian Jordan, Population Health, College of Veterinary Medicine

Coccidiosis is an economically significant enteric disease in chicken that is caused by several *Eimeria* species parasites. Among the different species of *Eimeria* that infect chickens, the independence of the species' *E. mitis* and *E. mivati* is controversial. Previously, *Eimeria* have been speciated based on gross morphology, pre-patent period, and region of the gut parasitized. More recently, molecular identification has been used to identify species. Full genomes of 7 *Eimeria* species have been published, but no molecular genomic data is present for *E. mivati*. The purpose of this study is to use genomic sequencing of a pure strain of *E. mivati* from a vaccine stock to determine similarities and/or differences between it and published *E. mitis* genomic sequence. For this, a DNA purification protocol that can isolate large fragment genomic DNA will be established. The genomic DNA will then be sequenced using next generation sequencing. The previously published genomes of other *Eimeria* species will be used to align the genomic sequences into a functional genome, and then specific genome markers will be compared. Understanding the similarities and differences in the genomic structure of this contested *Eimeria* will allow us to accurately determine its relatedness to other *Eimeria* and, ultimately, determine if it is truly a separate species.

Application of Heel Lift during Squat Task Decreases Trunk Flexion Overcompensation

Chandler Mulford
Dr. Cathleen Brown Crowell, Kinesiology, College of Education

Trunk flexion is an important characteristic of an overhead squat, and may change depending on heel height. The purpose of this study was to determine if differences in trunk flexion existed during assisted and unassisted squats in university club athletes. Eighteen ultimate frisbee players (14 males, 4 females; age=20.1±1.8yrs; height=185.7±25.7cm; weight=75.4±8.8kg) completed informed consent and underwent infrared camera motion analysis while wearing fifty-nine reflective markers. Participants were instructed to perform the unassisted squats while holding a bar directly overhead along the frontal plane of the body and lowering the pelvis to the lowest point possible. For the assisted squats a 2"x4" plank was placed under participants' heels to relieve gastrocnemius tightness and followed the same procedure as the unassisted squats. Trunk flexion was defined as anterior movement of the trunk along the sagittal plane as displacement from vertical. Overcompensation of trunk flexion during a squat was qualitatively measured and defined as the wrist markers passing a longitudinal reference line from the marker placed on the tibial tuberosity. The frequency of overcompensation for each condition was determined. A paired t-test was used to compare differences in frequency means between the two conditions ($\alpha<0.05$). The frequency of overcompensation in assisted squats (3.8±4.1) was significantly less than in unassisted squats (8.0±3.2) ($t(17)= 4.42$, $p<.001$). The lifted platform placed under the participants heels during the assisted squats resulted in increased ankle mobility and less trunk flexion overcompensation. Gastrocnemius stretching should be considered to decrease trunk flexion overcompensation and increase depth of bodyweight squats.

Meat Consumption as an Indicator of the Near Term Stability of Each Country's Food Supply in the Global Marketplace

Dylan Munn, CURO Research Assistant
Dr. John R Schramski, Environmental, Civil, Agricultural, and Mechanical Engineering, College of Engineering

Trends show that as countries inevitably become more urban, incomes will increase, but more importantly more meat is consumed. The human diet has been profoundly affected by globalization throughout the past half century. Research into the energetics of the food system and the

increasing urbanization of the world shows that the increased percent urbanization and per capita gross domestic product of a country is negatively and predictably affecting the per capita dietary energy production (per capita food calories grown decreasing) while the percent meat in citizens' diets is increasing. Because of the large energetic inefficiencies and water needs attributed to meat production, an increased strain will likely occur on national dietary energy production (calories grown in country), perpetuating an ever increasing reliance on international trade while simultaneously enhancing unsustainable practices within national borders, thus creating a self-enhancing feedback loop towards failure of the global food supply system. The over-reliance on global food trade to accommodate an increased focus on the production of meat is a dangerous position in the face of unstable geopolitics. International trade has provided food security to many countries enabling meat to become a larger source of calories for diets around the world, but data shows this is enhancing an unsustainable food supply in the near future. We provide an easy four quadrant metric to assess each country's trajectory in this cycle over the period of 1965 and 2005.

Non-Vocal Sounds in a Group of Western Lowland Gorillas

Maria Munoz, CURO Research Assistant
Dr. Roberta Salmi, Anthropology, Franklin College of Arts and Sciences

Previous studies in non-human primate communication have focused on vocalizations as a way to bridge the gap to understand the origins of language in humans. This study aims to investigate the use of non-vocal sounds (i.e., chest beating and hand clapping) in one group of habituated western lowland gorillas (*Gorilla gorilla gorilla*) at Mondika Research Center. Given that western gorilla habitat is dense, auditory gestures become important for understanding the communicative repertoire of the western gorilla. Focal and ad libitum samplings were used to collect behavioral data during two study periods (June - August 2007 and May 2009 - May 2010). Ten behavioral categories were identified, including: foraging, resting, playing, travelling, travel-pose, aggression, display extra-group, display within-group, vigilance and mating. Hand clapping, which has been observed with rarity in the wild, was observed during both study periods and was only observed in adult females, juveniles and infants. Its absence in adult males provides a good argument for intentionality and flexibility. In adult females, the majority of observances of hand clapping occurred during vigilance to alert individuals to potential threats. Hand clapping during play is predominantly done by infants, though females were observed to hand clap during play with infants. Chest beating occurs across age-sex classes in contexts of displays, within- and extra-group and in play. Auditory gestures, like chest beating are recognized as species-typical signals which are termed inflexible, but these findings suggest that western gorillas use gestures flexibly and differently depending on age-sex class.

The Effect of Aerobic Exercise on White Matter in Overweight Children: Studying the Effect of an 8-Month Exercise Program

Megan Murphy, Ramsey Scholar, CURO Research Assistant
Dr. Jennifer McDowell, Psychology, Franklin College of Arts and Sciences

Obesity has become an epidemic in America, with rates increasing dramatically over the past decade. Obesity is associated with multiple physiological problems but also causes deficits at the level of neural white matter (WM). Lowered integrity of WM is associated with deficits in cognitive control (CC), and these deficits are evident in obese children as they exhibit lowered academic performance and worse classroom behavior than their healthy-weight counterparts. However, aerobic exercise is shown to improve cognitive functioning and integrity of WM. This study sought to investigate the link between obesity, WM, CC, and aerobic exercise by comparing diffusion tensor imaging (DTI) brain scans before and after children participated in an 8-month program, in which they were assigned to either an aerobic exercise group (n=14) or sedentary group (n=9). The results showed decreased WM integrity in both groups over time in the left and right cingulate gyrus, the forceps major, and the right inferior longitudinal fasciculus. There was no significant interaction detected between groups as a function of exercise.

Novel Object Recognition: A Promising Approach to the Comparative Study of Memory in Porcine Vascular Cognitive Impairment Studies

Richard Dunstan Murray, CURO Research Assistant
Dr. Franklin Delano West, Animal and Dairy Science, College of Agricultural and Environmental Sciences

Dementia is a major threat to public health. The National Institute of Neurological Disorders and Stroke Progress Review Group recently cited "prevention of vascular cognitive impairment (VCI)" as a major research priority. Numerous therapies for dementia have failed in human clinical trials indicating a clear need for rigorous testing in a translational large animal model with brain anatomy and physiology more comparable to humans. Therefore, we are developing a novel VCI pig model in order to test an inexpensive treatment method known as remote ischemic conditioning (RIC). One of the major assessment tools used to determine if a potential VCI treatment is effective is by observing changes in cognitive function, specifically learning and memory. In the present study we evaluated the cognitive ability of normal six month-old male pigs via novel object recognition testing (NORT). The animals tested in this study will serve as a baseline for normal pig cognition and their performance will be compared to non-treated and RIC treated VCI pigs in the next phase of the study. NORT showed no significant difference in exploration time between similar objects during the sample trial, but a significant difference in exploration time between the familiar and novel objects during the test trial. There was also a significant difference in exploration time of the familiar objects between the sample and test trials. This data demonstrates pigs are capable of forming memories and the efficacy of a potential VCI treatment such as RIC can be evaluated using NORT in future VCI studies.

Biocompatible, Biodegradable and Antimicrobial Skin Substitute with Nitric Oxide Release for Instant Burn Wound Treatments

Sai Nagula, CURO Research Assistant
Dr. Hitesh Handa, Chemical, Materials, and Biomedical Engineering, College of Engineering

Severe skin injuries, some of the most common non-chronic medical conditions, require hospitalization to heal completely. Annually, over 100,000 patients die due to infection of these wounds during the skin healing process. We explored the potential clinical application of combining a biodegradable skin substitute with an antimicrobial agent to serve the dual purpose of effectively regenerating skin tissue, while also preventing pathogenic infection. After background research of various polymers commonly used for skin healing, we pursued a novel combination of hyaluronic acid, a naturally occurring polymer in humans, and alginate, a biodegradable polymer derived from algae. As an antimicrobial agent, we added GSNO (G-nitrosoglutathione) to this polymer combination. GSNO releases nitric oxide, a natural antimicrobial mechanism found in our bodies. After performing nitric oxide release kinetics, an optimal skin substitute composed of 1:1 of 2%(wt/v) hyaluronic acid to 2%(wt/v) alginate with 20% (wt) of GSNO was found. Various physical characterization experiments were performed, including contact angle, moisture content, SEM, degradation studies, as well as biological characterizations, including cytotoxicity studies and zone of inhibition with *S. aureus* and *P. aeruginosa*. From the results, we observed data that were consistent with currently available skin substitutes. The cytotoxicity results indicated that the GSNO levels were not toxic to mammalian cell types, and the zone of inhibition studies showed inhibited growth of both bacteria types. Overall, these results demonstrate the potential for the novel combination of hyaluronic acid, alginate, and GSNO for future clinical studies in preventing death from infection of severe skin wounds.

Investigation of Nap1 as Reporter for CaaX Protein Post-Translational Modification Shunt Pathway

Christina Marie Najjar, CURO Research Assistant
Dr. Walter K Schmidt, Biochemistry and Molecular Biology, Franklin College of Arts and Sciences

All DNA genetic material in eukaryotes is packaged into nucleosomes, a process necessary for modulating gene expression. The nucleosome is composed of several histone proteins. Assembly of the histone 2A and 2B heterodimer requires a chaperone protein, the nucleosome assembly protein 1 (Nap1p) that is encoded by the *NAP1* gene. Limited evidence suggests that Nap1p can be categorized as a CaaX protein and thus potentially subject to the 3-step post-translational modification pathway typically associated with CaaX proteins: isoprenylation, proteolysis, and carboxylmethylation. In plants, AtNap1p is known to be farnesylated, a modification associated with CaaX proteins. It is unclear whether proteolysis and carboxylmethylation occur. In humans, HsNap1 appears to be farnesylated, but the presence of farnesylation is inferred. This study investigates the post-translational modification of yeast and human Nap1, especially in light of the recent discovery that some CaaX proteins avoid the second and third post-translational modification events after initial isoprenylation. This project explores the potential use of Nap1 as a reporter for this alternative pathway (i.e. shunt pathway). Plasmid constructs encoding wildtype and mutant versions of Nap1 were designed as experimental tools to determine the post-translational modification status of Nap1. Constructs contain various CaaX combinations (CKQS, SKQS, CTLM, CVIA, CASQ) and affinity / localization tags (i.e. His8, GFP) for use in biochemical, genetic, and cell-based assays. Thus far, farnesylation in human and yeast homologs have been confirmed and current studies are underway to establish the impact of mutations on function and localization of Nap1.

Glycosylation in Spores

Sholeh Namdari
Dr. Maor Bar-Peled, Biochemistry and Molecular Biology, Franklin College of Arts and Sciences

Endospore forming bacteria produce a dormant spore that is resistant to harsh environmental conditions. We examined the function and role of rare carbohydrate produced during spore formation in pathogenic bacteria belonging to Bacillus cereus group. We identified an operon encoding several enzymes that are involved in nucleotide-sugar synthesis. Purified recombinant enzymes were tested for their specific activities by LC-MS/MS. In addition, the use of in microbe approach helped to identify the enzymatic products produced by the four different genes. Using LC-MS/MS and HPLC, I have determined the initial function of each of the enzymes and helped elucidating an unknown metabolic pathway in this group of bacterial strains. I was able to trace the biochemical changes that form and transform a simple sugar-phosphate to three different activated nucleotide-sugar forms. Furthermore, I am working on the molecular mechanisms that facilitate the incorporation of these sugars into surface glycoproteins that are displayed on the outermost surface of spores of *Bacillus cereus* and examined their potential role in biofilm formation and or host recognition.

Examining Stigma and Social Functioning in Young Adults with Autism

Maggie Naughton, CURO Research Assistant
Dr. Ashley Johnson Harrison, Educational Psychology and Institutional Technology, College of Education

There is mounting evidence demonstrating the negative impact of stigma experienced by parents of children with autism spectrum disorder (ASD; Gray, 2002; Farrugia, 2009; Mak & Kwok, 2010). Little research has investigated the consequences stigma has on the diagnosed individual, particularly adults. The current study assesses the relationship between stigma (with subscales measuring discrimination, positive aspects of the disorder, and disclosure) and social variables, including self-esteem, self-efficacy, and social satisfaction in adults with ASD. Participants (n = 20) were recruited from university disability resource centers, autism-related events, and other support services. Participants (M = 26.77 years, range = 18.59-57.94) completed psychometrically supported measures to assess stigma, self-esteem, self-efficacy, and social satisfaction. Results showed that adults experiencing more self-reported stigma have lower self-efficacy and lower overall social satisfaction. Additionally, those who experience more discrimination have lower social satisfaction, and those who express more positive aspects of their diagnosis have higher self-esteem. As rates of ASD continue to rise, more individuals with ASD will likely enter post-secondary education or professional settings; therefore, exploring variables that impact adaptive social

function among young adults has increasing importance. More specifically, examining how stigma affects the social outcomes of adults, such as self-esteem, social competence, and social satisfaction, may provide educational institutions or workplaces with information that is necessary to develop and implement more appropriate support structures for students or employees with ASD.

Implementation of Structure from Motion from a Cube Satellite in Low Earth Orbit

Hollis Neel, CURO Summer Fellow, CURO Research Assistant
Dr. Marguerite Madden, Geography, Franklin College of Arts and Sciences

The UGA Small Satellite research laboratory's mapping and ocean color imager mission utilizes an algorithm known as structure from motion (SfM) which recreates 3D maps of a surface. In order to achieve this we have to consider factors such as computational complexity, hardware constraints, atmospheric distortion, and orbital optimization. To maximize the effectiveness, we will attempt to write custom SfM software specifically for our system using the Scale Invariant Feature Transform algorithm. This algorithm creates thousands of key points in any image and if two images have the same key point it is then possible to tie them together. This allows us to calculate the geometry of the object we are imaging. This is calculated by knowing where the cameras precise position was at the time of each picture and then using epipolar geometry to triangulate the location for the rest of the tied points. To optimize this for in orbit applications, we will be able to make estimations on where the tied points should occur in each image. This paired with the near constant attitude to reduce computing camera position shows promise to greatly reduce the computational complexity of the algorithm. We also plan to implement our algorithm in software from either a field programmable gate array or a graphical processing unit. This shows promise to also reducing the computation time even farther due to SfM's computationally greedy past. Pairing all of this with a custom SfM testing suite in blender has allowed us to simulate these scenarios on a to-scale model.

The Effects of Aging on Neuroblast Proliferation in the Pivotal Lateral Ventricle Region: A Canine Model

John Newman
Dr. Buffy Howerth, Pathology, College of Veterinary Medicine

Through the studies of legendary neuroscientist Santiago Ramón y Cajal, it was previously thought that the adult brain lacks the ability to regenerate neurons. In modern science, adult neurogenesis has been well established in the hippocampal region of rodents. Since this landmark, many studies of adult neurogenesis in the hippocampus of gyrencephalic species, such as bovine, have been conducted. However, the ontogeny of neurogenesis in the canine brain, particularly in the lateral ventricle region, is poorly understood. Data concerning the importance of the lateral ventricle and its accompanying cerebrospinal fluid in trauma repair, nutrient delivery and waste removal is burgeoning. Therefore, it is vital to elucidate the neurogenic properties of this region, and the tissue surrounding it. Here, we evaluate the relationship between age and proliferation of neuroblasts, or immature neuronal precursors, in the Subventricular Zone (SVZ) of the lateral ventricle region of the canine brain. The SVZ is a proven hotspot for robust neuroblast proliferation, and thus an excellent target for evaluation. Also, considering the canine brain is similar to humans in that it contains many gyri, there is ample opportunity for neuroblasts to migrate through the SVZ via the Rostral Migratory Stream (RMS). We hypothesize that as age increases, the robustness of neurogenesis in the canine brain will decrease, as indicated by decreasing numbers of DCX and Ki67 immunopositive cells. To address this, formalin fixed brains from dogs of various ages submitted for postmortem examination and with known pathologies were evaluated. Immunohistochemical staining of transverse sections of forebrain for doublecortin protein (DCX) and Ki67 were performed in order to assess the density of migrating neuroblasts, and general cell proliferation, respectively.

Simulation of Small Satellite Photovoltaic Power Generation System

Khoa Minh Ngo, CURO Research Assistant

Dr. Marguerite Madden, Geography, Franklin College of Arts and Sciences

A satellite is artificial body placed in orbit around the earth or moon or another planet in order to collect information or for communication. One example of a satellite is a retroreflector sphere. A retroreflector is a small spherical object that has retroreflector built across its outer surface area to directly reflect any laser back to its origin. This type of satellite does not require a power system and it is use to study geo-referencing methods in orbit. However, many satellites require a power system in order to power its payload and transmit data to ground. Typically, powered satellites will be equipped solar panels for Earth orbiting mission. Solar panels, also known as solar powered photovoltaic (PV) panels, convert the sun's rays into electricity by exciting electrons in silicon cells using photons of light in the sun. This electricity can then be used to give an energy supply of electricity or used to charge a battery. Because the amount of electricity generated from photovoltaic cells are tied to the amount of photons hitting the cells, we can estimate a satellite's solar power generation by estimating the amount of sun light shining on the solar panels. This research focuses on estimating the power generation of a CubeSat in orbit using rough order-of-magnitude (ROOM) predictions and complex orbital simulation analysis. The result of this research will allow us to better understand how satellite power generation potential is affected by orientation, seasons, and orbital parameters.

Evolution of Body Size in *Drosophila subquinaria*

Amy Nguyen
Dr. Kelly Dyer, Genetics, Franklin College of Arts and Sciences

Selection can shape trait variation and can be studied by examining the interplay between genes and environment in natural populations of *Drosophila*. *Drosophila subquinaria* occurs throughout western North America. Initial observations indicate that coastal populations have a substantially larger body size than inland populations despite extensive gene flow across the range. It can then be hypothesized that large body size in coastal populations of *D. subquinaria* is a derived trait and due to differences in selection. To better understand the role life history evolution has played in populations of *D. subquinaria*, questions regarding if coastal (large) females are more fecund and lay larger eggs than inland (small) females. Egg size is an important life-history character that is positively associated with offspring fitness and affects development rate (egg-larva and egg-adult). Likewise, fecundity is a critical life-history character in that the more fecund a female is the more opportunity she has to spread her genes to the next generation and beyond. This will be examined by measuring female wing size and oriole size in different iso-female lines and its correlation with the number of eggs laid and the size of the eggs laid. By understanding the variation in egg size/number in populations of *D. subquinaria*, determination of the sources of selection acting on body size and the benefits to maintaining a larger body in coastal populations can be achieved.

Investigation of Antimicrobial Resistance in *Salmonella* and *Escherichia coli* isolated from the Upper Oconee Watershed

Anh Hoang Thi Nguyen
Dr. Jonathan G Frye, Microbiology, Franklin College of Arts and Sciences

Bacterial contamination of surface water from agricultural runoffs, sewage drainage, and natural sources can contribute to disease transmission. This is concerning due to increasing antimicrobial resistance (AR) in bacteria. Overuse of antibiotics and the spread of mobile genetic elements (MGEs) encoding AR has contributed to the emergence and dissemination of resistant bacteria. Pathogens, like *Salmonella* and *Escherichia coli*, can acquire AR through MGEs such as plasmids. To determine if bacteria in surface water were resistant to antimicrobials or carried MGEs, water samples were collected from the Upper Oconee Watershed in Georgia; *Salmonella* and *E. coli* were isolated from the samples and characterized. Fifty-four *Salmonella* and *E. coli* isolates were resistant to the antimicrobials tested. Resistant isolates were assayed for the presence of plasmids and were genetically fingerprinted using Pulsed-field Gel Electrophoresis (PFGE). Plasmids were detected

in 7/22 *Salmonella* including the IncN and IncA/C plasmids. One *S. Newport* isolate contained an IncA/C plasmid and was resistant to 10/14 antimicrobials tested, including tetracycline, ceftriaxone, and streptomycin. This resistance profile matched *S.* Newport strains associated with foodborne outbreaks. *Salmonella* isolates containing the IncN plasmid were resistant to tetracycline and trimethoprim and/or sulfamethoxazole. Approximately 69% of PFGE profiles determined for the *Salmonella* isolates were identical or similar to PFGE profiles of clinical isolates from the Centers for Disease Control and Prevention PulseNet database. Approximately 78% of the *E. coli* isolates contained at least one plasmid. These results show the potential role of surface water in harboring antimicrobial resistant bacteria that may cause human infection.

Instant Clotting Patch to Prevent Excessive Bleeding during Emergency Injuries

Dieu Thao Nguyen, CURO Research Assistant
Dr. Hitesh Handa, Chemical, Materials, and Biomedical Engineering, College of Engineering

Excessive blood loss continues to be one of the leading causes of death at in war fields, road accidents, surgeries, and other emergency situations. In addition, the presence of common bacteria exacerbates the wound by diverting the inflammatory response away from healing the injury and toward eradicating the infection. The objective of this research is to fabricate a bio-inspired wound dressing which can form instant blood clot and also minimize bacterial reduction. The internal layer of the bilayer wound dressing is composed of an adhesive suspension of propolis, fibrin, and Tranexamic acid. Propolis, a natural antimicrobial agent, prevents bacteria from adhering and proliferating on wounded areas, reducing the susceptibility to infection. Fibrin provides a platform onto which platelets and blood cells can attach, forming blood clots. Tranexamic Acid, an antifibrinolytic, reduces the degradation of blood clots, thus stabilizing them. The external layer consists of a nitric oxide (NO) releasing agent. NO is a crucial cellular signaling molecule which has a proven role in wound healing process via regulation of cell proliferation, angiogenesis, inflammation and prevent of infection. The wound dressing will be characterized for antibacterial potential, biocompatibility, mechanical testing, surface properties, NO flux analysis, hemocompatibility, gene expression and in vivo animal studies. The preliminary tests have shown promising results and the novelty of the wound dressing provides an innovative approach to ensure a greater promise for recovery from injuries.

Using Serological Tools to Measure the Prevalence of Filarial Infection after Mass Drug Administration

Stephanie Nguyen, CURO Research Assistant
Dr. Patrick J Lammie, Cellular Biology, Franklin College of Arts and Sciences

Evaluating the success of mass drug administration (MDA) programs to eliminate lymphatic filariasis (LF) requires monitoring of infection in sentinel communities. At the beginning of MDA, LF programs monitor the levels of parasites in the blood stream, but as infection levels decline, parasite antigen and antifilarial antibody prevalence are used to assess progress. In this study, I will analyze blood serum samples by using serological tools to determine the status of LF infection in the community of Saut D'eau, Haiti. Serological tools, such as Immunochromatographic Card (ICT) tests and Multiplex assays, will provide a comprehensive evaluation of LF antigen and antibody prevalence, respectively. Participants were tested for LF antigen by ICT and dried blood spots (DBS) were collected for assessment of antibodies to LF and other infections by Multiplex. By evaluating other other parasitic antibodies, such as Malaria, Tetanus, Measles, Cysticerosis, and Toxoplasma, I will achieve a greater understanding of the overall health status of the community. After data collection, I will create age prevalence curves via Excel® to determine the presence of particular antibodies in respect to aging. In addition, I will compare the percentage of individuals positive for LF antigen in ICT versus LF antibodies in Multiplex to assess which assay is more sensitive to the presence of infection. Conducting these experiments will allow me to determine the status of particular infections and the progress of the MDA LF program in Saut D'eau.

Examining the Arrhythmogenicity of Dobutamine When Used in Conjunction with Isoflurane or Sevoflurane

Emily Nieves, CURO Research Assistant
Dr. Rachel Reed, Large Animal Medicine and Surgery, College of Veterinary Medicine

Dobutamine is an inoptric agent typically administered to counteract the low cardiac output associated with isoflurane, sevoflurane, and other types of anesthesia, but has been known to cause arrhythmias as well. The increased risk of arrhythmias during surgery may lead to an increase of complications during surgery, as irregular heartbeats can mean decreased blood flow to vital organs. Previously, halothane was administered to maintain anesthesia, and was found to cause a significant number of arrhythmias when coupled with dobutamine. Since isoflurane and sevoflurane replaced halothane as a means of maintaining anesthesia, there have been few studies investigating the occurrence of arrhythmias when dobutamine is used in conjunction with isoflurane or sevoflurane. This experiment serves to bridge that gap in knowledge by examining the arrhythmogenicity of dobutamine when given to horses that have been anesthetized with either isoflurane or sevoflurane. This experiment was conducted as a retrospective study. The data was collected using anesthesia records from the UGA Veterinary Teaching Hospital. 200 horses were studied and variations in heart rate and other variables were recorded as well as any documentation of arrhythmias. It is expected that the occurrence of arrhythmias will be much lower in the horses studied than in the horses that were administered halothane in previous studies.

Facilitating the Continuous Expression and Secretion of the Influenza Surface Glycoprotein, Hemagglutinin, within Human Cells

Santosh Nimkar, CURO Research Assistant
Dr. Ted M Ross, Infectious Diseases, College of Veterinary Medicine

Influenza is a viral infection that causes severe respiratory illnesses and, during epidemics, is responsible for 250,000 to 300,000 deaths per year worldwide (WHO). Due to antigenic shift and drift, many different antigenic combinations occur resulting in pandemics and seasonal epidemic infections. Hemagglutinin (HA), a surface glycoprotein on influenza virions, initiates the viral binding to human host cells, thereby initiating the infection. One of the major mechanisms of protection from influenza infection is the ability of specific antibodies to bind to the viral surface of, particularly, the HA glycoprotein. Given the central role of HA in influenza infections due to it being a major target of the humoral immune response, study of this protein is critical to understand, not only, the immune response to the virus but also the biology of the virus, itself. Therefore, the goal of my project is to clone HA genes of various pandemic and seasonal influenza viruses and insert them in mammalian expression vectors for the stable transfection of human embryonic kidney (HEK)-293T cells. Ideally, this will allow for continuous expression and secretion of this protein for purification. Up to this point, through polymerase chain-reaction (PCR), restriction enzyme (RE) digestion and ligation followed by transformation and mini-prep purification, I have successfully obtained the ideal DNA plasmids for transfection. Later on, positively-transfected HEK-293T cells will be evaluated for HA expression and subjected to antibiotic (Zeocin) selection from which resistance is conferred by the transfecting plasmids.

Archaeometry of Argentinean Rock Art

Autumn Nobles, CURO Research Assistant
Dr. Tina Salguero, Chemistry, Franklin College of Arts and Sciences

From the famous Lascaux cave paintings in France to Cueva de las Manos in Argentina, naturally occurring pigments have been used as colorants since antiquity. The pigments used were typically composed of common minerals found in the region of the artist. The high availability of these inorganic compounds coupled with their high resistance against weathering made them a key ingredient in early artwork. The primary goal of this project is to identify the mineral composition of the pigments used in cave art samples from Santa Cruz, Patagonia and to compare them to local mineral sources. Studies on rock art pigments have been conducted in Argentina, but there have been few studies comparing these samples to the natural pigments to minerals found in the surrounding region. The

beginning stages of this project focused on analyzing ~20 soil samples from the Southern Deseado Massif region of Patagonia with X-ray Diffraction (XRD), Electron Dispersive Spectroscopy (EDS), and Raman Spectroscopy. The chemical composition and structural information gathered from these techniques were then used to compile a database of possible pigment sources. For the second part of this project, Patagonian cave art samples were analyzed with Scanning Electron Microscopy (SEM) and EDS. In order to achieve high quality images and data, each sample was embedded in epoxy, polished and carbon-coated. The elemental data from the cave art samples was then compared to that of the soil samples, in order to search for a link between pigment and source.

The Effect of Macrocyclic Lactones on the Canine Immune Response towards the Heartworm Parasite *Dirofilaria immitis*

Connor Matthew O'Neill, CURO Summer Fellow, CURO Research Assistant
Dr. Adrian Wolstenholme, Infectious Diseases, College of Veterinary Medicine

Dirofilaria immitis is a parasitic nematode that causes heartworm disease in cats and dogs. To prevent *D. immitis* infections, which primarily occur in the pulmonary arteries of an infected dog or cat, macrocyclic lactone (ML) drugs – like ivermectin (IVM) and moxidectin (MOX) – are typically administered to healthy animals each month. In the last 10-15 years, loss of efficacy (LOE) cases have been reported where IVM treatments appeared not to have worked, primarily in the Mississippi Delta Region of the United States. Previous work at UGA has resulted in the isolation of *D. immitis* isolates that have been confirmed to be resistant to IVM in vivo. Work in our laboratory has shown that, in vitro, the drug increases recognition of IVM-susceptible larval worms by cells of the dog innate immune system, neutrophils and mononuclear cells. Therefore, the end goal of this project is to answer whether or not there is a correlation between the effects of different MLs at various concentrations on cellular recognition of parasite larvae in vitro and the ML resistance of the *D. immitis* strain being tested. To date, MOX has been found to significantly increase PBMC binding to susceptible strains of *D. immitis* at concentrations above 0.1 μM while IVM has done so above 1 μM. Likewise, MOX has significantly increased PBMC binding to resistant strains of *D. immitis* at 0.1 μM, while IVM did not do so at any concentration. We are currently examining two other strains of *D. immitis* for resistance towards ML drugs.

Attention-Deficit/Hyperactivity Disorder (ADHD) Subtypes: Cross-Informant Agreement and Stability from Childhood to Adulthood

Selin Odman
Dr. Jason Nelson, Psychology, Franklin College of Arts and Sciences

Attention Deficit Hyperactivity Disorder (ADHD) is a complex disorder that is challenging to accurately identify. When clinicians diagnose ADHD, they assign a specific subtype to their patients. Minimal research has investigated the reliability of these subtype designations. The purpose of this study was to investigate the reliability of assigning ADHD subtypes across time and informants within the following ADHD subtypes: inattentive, hyperactive-impulsive, combined (inattentive and hyperactive-impulsive), and other specified. Participants (N = 634) were individuals who were diagnosed with ADHD via a neuropsychological evaluation at a university-based clinic. Participants and their parents completed measures of childhood and current ADHD symptoms using the 18 DSM symptoms of ADHD. Kappa values measuring agreement across time and informant ranged from slight agreement to fair agreement for all subtypes. In addition, preliminary analysis shows a 59% agreement for child subtype rating between raters, a 45% agreement for current subtype rating between raters, a 68% agreement for self subtype rating across time, and a 53% agreement for other subtype rating across time. In conclusion, the currently accepted and wide-spread ADHD subtype assignments show low agreement across time and informants. This ultimately causes challenges for clinicians, who have to assign labels to their patients using contradicting information from different sources.

Characterization of Genes Predicted to Function in Signaling for Expression of RNA Repair Operon in *Salmonella*

enterica serovar Typhimurium

Obi Okafor, CURO Research Assistant
Dr. Anna Karls, Microbiology, Franklin College of Arts and Sciences

Salmonella enterica serovar Typhimurium, a food-borne human pathogen, must survive an arsenal of host defenses during infection. Understanding pathogen survival strategies facilitates the design of antimicrobials and vaccines. Our laboratory has previously shown that the RNA repair operon of Salmonella increases survival of the pathogen under conditions that damage nucleic acids, such as exposure to the antibiotic mitomycin C (MMC). The purpose of this project is to identify the genes that are involved in generating the signal that activates RtcR, a transcriptional regulator of the RNA repair operon. A reporter strain for quantitating transcription of the RNA repair operon was created in *S*. Typhimurium by replacing the first gene of the operon with *xylE*; the gene product of *xylE* converts catechol to a quantifiable yellow compound. The BEI Resources collection of *S*. Typhimurium deletion mutants, which has nonessential genes replaced individually with kanamycin- or chloramphenicol-resistance cassettes, is a source for deletions/substitutions of genes that are predicted to play a role in generating signaling molecules. Initially focusing on the *rna* (RNase I) or *rpoS* (sigma factor S) genes, I used PCR to confirm the Δ*rna*::Kan^R and Δ*rpoS*::Kan^R mutations in the BEI resource mutants and P22 transduction to move the mutations into the *xylE*-reporter strain. MMC treatment will be used to induce RtcR-dependent expression of the RNA repair operon and the level of *xylE* expression will be measured in the wildtype and mutant strains to determine whether *rna* or *rpoS* are required for generating the signal that activates RtcR.

Justice for All: Addressing Codified Discrimination in the Georgia Justice System

Nanma Okeani
Dr. Susan Haire, Political Science, School of Public and International Affairs

This policy research investigates the troubling prevalence of codified discrimination within the judicial system of Georgia, particularly within the jury selection process and against the state's public defense system. Discriminatory practices widen the division between minority members and law enforcement, and increase the skepticism many groups harbor about the equity of the justice system as a whole. The overworking and underpayment of state public defenders undermine the constitutional rights of Georgia citizens, while also exacerbating the issue by deterring potential law students from careers in public interest, like public defense. Leniency against attorneys who use peremptory challenges to stack juries through the elimination of minority groups result in cursory decision-making within juries, a lack of diversity in race and perspective, and wasted court time. To address these issues, three policy alternatives were formulated: a reduction in peremptory challenges, third party presiding sources for Batson challenge reviews, and pay parity for prosecutors and public defenders. After analyzing the effectiveness, cost-benefit, and feasibility of each alternative, this policy paper asserts that the third party presiding source is the best option.

Majority Party Factionalism and Gridlock in State Legislatures

Rob Oldham, CURO Summer Fellow, CURO Research Assistant
Dr. Anthony Madonna, Political Science, School of Public and International Affairs

Congressional gridlock is often blamed on majority party factionalism. After the 2010 elections, a group of strongly conservative Republicans, sometimes referred to as the Tea Party or the Freedom Caucus, prevented Congress from passing legislation on salient issues even when there was a bipartisan majority that supported it. Conservatives took advantage of institutional rules and a polarized electorate to obstruct legislation with majority support such as government funding bills and comprehensive immigration reform. Although obstructionism has been well documented at the national level, there have not been similar studies at the state level. I attempt to fill this gap by examining the relationship between majority party factionalism and gridlock in state legislatures from 2001 to 2013. Using McCarty and Shor's (2015) ideological scores for state legislators, I calculate a measure of factionalism in majority party caucuses. I examine

the effect of factionalism on legislative output and on the enactment of major policy items. I hypothesize that increased majority party factionalism will lead to heightened levels of gridlock, especially when supermajoritarian rules facilitate obstructionism.

Examining Younger Age at Menarche in Mexican-American Girls

Ginny Lee Olivier
Virginia Olivier
Dr. Jennifer L Gay, Health Promotion and Behavior, College of Public Health

During the past century girls have been having their first menstrual period (attaining menarche) at younger ages. This may be due in part to increased body fat in childhood and adolescence. Previous studies also have found a correlation between girls' age at menarche and mothers' age at menarche, although this may be moderated by overweight or obesity. Because prior research has mainly studied Caucasian populations, the aim of this study was to determine if the relationship between daughter's age at menarche with mother's age at menarche varied by body composition in a sample of Mexican-American girls. Data were obtained from 446 girls from a larger cross-sectional survey of Mexican-American students in grades 4-12 in south Texas. Height, weight, BMI, and body fat percent were measured. Girls and their mothers self-reported age at menarche. A general linear model was tested with age at menarche as the dependent variable. Interestingly, girls in this sample attained menarche at a significantly younger age than their mothers by 1.5 years ($p=0.000$). The relationship between mother's and daughter's age at menarche approached significance ($p=0.082$) in the general linear model. This relationship did not vary by body fat percentage. Because of this study's cross-sectional nature, a future longitudinal study of Mexican-American girls could determine if there is an association between childhood body fat and age at menarche. As earlier age at menarche has been shown to be associated with greater cardiovascular disease risk, this factor may be considered in prevention efforts.

The Effect of High-Fat Diet in Altering the Metabolism of Mice with Differing Expressions of RGS10

Erik Olsen
Dr. Jae-Kyung Lee, Physiology and Pharmacology, College of Veterinary Medicine

Regulator of G-Protein signaling protein (RGS) 10 has shown to negatively modulate levels of inflammation by inhibiting macrophages and microglial activation. Although immune response is an important part of brain health when functioning normally, abnormal or chronic inflammation is known to be a risk factor not only in brain health but also in peripheral system. The mechanism of RGS10 in immune cells and other cell types has not identified, yet. Interestingly, when RGS10 knockout mice were characterized by Jackson Laboratory, they reported RGS10 knockout (KO) mice displayed impaired glucose tolerance. We also observed that RGS10 knockout mice gained more weight with aging (unpublished observation). These imply its role in metabolism and/or obesity. To better understand the role of RGS10 in metabolism and obesity, we have conducted a study that investigates the effect of high fat diet on RGS10 KO mice. RGS10 KO mice and wild type (WT) control mice were fed a diet of low fat (LF) or high fat (HF) for 8 weeks. At week 8, HF-fed RGS10 KO mice displayed significantly increased body weight compared to HF-fed WT mice. HF-fed RGS10KO mice displayed significantly increased retroperitoneal adipose tissue and liver weights. Especially, HF-fed RGS10 KO mice displayed insulin resistance which implicates in metabolic disregulation in these mice. This study is the first time one has investigated the role of RGS10 in metabolism and obesity. With further research, this understanding can be used to search for a deeper understanding of the biochemical regulation pathways that play large roles in both metabolic disorders and neurodegenerative disease.

The Rules Change the Game: Delegate Allocation Variations and Presidential Primary Season Length

Paul DuPont Oshinski, CURO Research Assistant
Dr. Joshua Tyler Putnam, Political Science, School of Public and International Affairs

Scholars examining presidential primaries have long-discussed how the primary rules that govern

the allocation of delegates in each state play significant roles in the primary process as a whole. As there are myriad primary rules that alter delegate allocation methods, this research argues that different rules favor different candidates, depending on a candidate's positioning in the primary race. This paper finds that candidates leading in the primary race (i.e. frontrunners) receive more delegates in winner-take-all primaries than in any other delegate allocation method, including proportional representation, winner-take-most, or any hybrid delegate allocation method. The success of front-runners in winner-take-all primary states yields a shorter primary season for both the Republican and Democratic parties. Variables such as momentum, frontloading, primary contest type, and electorate preferences are controlled for in a regression analysis examining the effect of delegate allocation methods on presidential primary length. The study uses delegate count data from Republican and Democratic primaries in the 2008 and 2012 presidential elections and analyzes which delegate allocation methods produce a quicker primary victor. By examining delegate counts in these two elections, this study uncovers which delegate allocation methods both offer the front-runner the greatest delegate payoff and lead to a quicker primary season for both Republican and Democratic parties.

Introductory Biochemistry Students' Use of Learning Objectives

Bethany Osueke, CURO Research Assistant
Dr. Julie Dangremond Stanton, Cellular Biology, Franklin College of Arts and Sciences

Learning objectives are tools used to articulate the knowledge and skills instructors intend their students to acquire by the end of a particular section of material or an entire course. Learning objectives make goals and expectations clear while providing organization for teaching and learning. By aligning course instruction and assessment, learning objectives have been shown to enhance student performance. There have been many studies on how faculty should write and use learning objectives in the classroom. Yet little attention has been given to understanding how students use learning objectives in order to study effectively. Academic faculty should be invested in engaging with learning objectives from a student-centered perspective. This study employed two open-ended surveys to explore students' perceptions and uses of learning objectives. Participants were undergraduate students taking Introductory Biochemistry at one institution (n=185). The surveys were completed after the students' first and second exams. We used content analysis to identify key ideas within students' answers. Most participants used learning objectives by answering them as if they were questions. Students perceived the purposes of learning objectives to be showing them what is important to learn, providing organization, and helping them meet their instructors' expectations. Students also reported that the learning objectives helped focus their study for exams and for learning purposes. Ongoing research is centered on how students' use of learning objectives affects their exam and course grades.

Investigating a Potentially Novel Cache Valley Virus Variant in a Clinical Case in Missouri

Isabel Ott, CURO Honors Scholar, CURO Research Assistant
Dr. Daniel Mead, Population Health, College of Veterinary Medicine

The Southeastern Cooperative Wildlife Disease Study (SCWDS) investigates wildlife mortality events in the southeastern United States. In July of 2015, the Missouri Department of Conservation submitted samples from a white-tailed deer (*Odocoileus virginianus*) euthanized after showing signs of hemorrhagic disease. Submitted samples tested negative for hemorrhagic disease viruses and other major viruses of white-tailed deer using reverse transcriptase polymerase chain reaction (RT-PCR). Further tests detected an *Orthobunyavirus*, a genus of arthropod-borne RNA viruses distributed worldwide, showing highest similarity to Cache Valley virus (CVV). CVV, better known as a cause of severe neurological birth defects in sheep, has previously been isolated from asymptomatic deer. The deer's unusual clinical profile suggested the potential presence of a genetically variant strain. Variant or novel orthobunyaviruses emerge relatively frequently, as they lack replication proofreading mechanisms and frequently exchange genetic material between species. To explore this possibility, partial segments of the isolate's genome were amplified

and sequenced using RT-PCR and short-read Sanger sequencing. Sequence data analysis showed a high similarity between the isolate and two different lineages of CVV, suggesting that genetic exchange between traditional Continental US and Mexico lineages had occurred. The Mexico lineage, introduced to the Northeastern US in 2010, has caused more severe birth defects than previous strains. Further genetic characterization of the clinical isolate, along with analysis of historical Georgia isolates, should better define the virus's ancestry and potential causes for its unusual pathogenicity.

From Ancient Artifacts to 3D Printers: Using Modern Engineering Tools to Enhance Our Understanding of Classical Athenian Elections

Chris W Overbaugh, CURO Research Assistant
Dr. Naomi Norman, Classics, Franklin College of Arts and Sciences

This project is an interdisciplinary effort between UGA's departments of Civil Engineering and Classics. To better serve the nationwide classics pedagogy developed in part by Dr. Naomi Norman, Reacting to the Past, 3D modelling and additive manufacturing are employed to create high-fidelity, low-cost replicas of artifacts pertaining to Athenian Democracy. By using information found from excavations at the Athenian Agora in Greece, models of ballots and other artifacts were created in AutoCAD. Pictures were analyzed to develop fonts representative of inscriptions on the ballots, and a trial and error process varying the weight, size, and style of the font (2D characteristics) and depth and shape of inscription (3D characteristics) were used to select the most legible representation. The models were refined for more efficient and higher-quality 3D printing by breaking the artifacts in to various pieces to be joined in post-processing. Replicas were printed on Makerbot Replicator+ machines using PLA filament and models will be shared via an online community for universities using Reacting to the Past to print. The use of the replicas in Dr. Norman's FYOS seminar will be observed to assess impact. The design process will be presented as findings alongside all existing artifact replicas. Additive manufacturing is becoming commonplace in educational systems to create effective hands-on teaching tools. The replicas created in this research/design process are both effective tools and highlight the benefits that an engineering perspective and expertise can bring when applied to other disciplines. This project will set precedence for future collaboration at UGA.

Exploring Uncertainty in Models of Mosquito Vector-Borne Disease

Jack Owen, CURO Research Assistant
Dr. Courtney Murdock, Infectious Diseases, College of Veterinary Medicine

Understanding the dynamics of the spread of mosquito-borne diseases such as malaria and dengue virus are important public health challenges, as these diseases affect millions of people around the world. Mosquitos, like most ectotherms, are heavily influenced by the temperature of their environment. Recent work suggests that mosquito traits and thermal performance follow a unimodal response to temperature, with an "optimal range" in the middle that decreases as the temperature moves in either direction. Global climate change data indicate that different parts of the world may move into the mosquitos' optimal range in the coming years, changing the prevalence of mosquito-borne illnesses in those areas. Little empirical work, however, has been done to validate data gathered from metadata studies from which the unimodal thermal performance was generated. This experiment monitored mosquito mortality, bite rate, and fecundity across a range of temperature points in laboratory incubators. From the results, we will be able to further specify which variable is the most important driver of mosquito transmission potential.

The Effects of Temperatures on the Stability and Infectivity of Arboviruses

Hannah Packiam, CURO Research Assistant
Dr. Melinda Brindley, Infectious Diseases, College of Veterinary Medicine

Viral stability can affect how long viral particles remain infectious in the environment. In addition, the stability, or lack of stability, of viral particles may impact experimental outcomes if particles are easily inactivated. In this study, we investigate the effects of temperatures on the stability and

infectivity of arboviruses. Understanding how both high and low temperature treatments alter particle infectivity may enable us to design better experiments concerning chikungunya virus, dengue virus, and Zika virus in our lab. To specifically examine the stability of the arboviral particles, I determined the temperature that inactivated particle infectivity as well as examined how freezing affects the viral titers. Dengue virus was less thermally stable than attenuated chikungunya virus and Zika virus, and was inactivated at a lower temperature. To determine if freezing viral stock alters the titer, I produced viral stocks and titered them immediately, as well as after short freezing periods (4 and 24 hours) and compared to a full-week time period. Preliminary results suggest that the viral titers remained similar to unfrozen material when frozen for short periods, but decreased significantly after being frozen for 7 days. Thorough understanding of viral particle stability and how infectivity can change due to temperature exposures will be informative as the lab undertakes additional experiments comparing how arbovirus infectivity and transmission potential changes over a range of temperatures.

South African Wineries and the US Wine Market

Kavi Pandian, Foundation Fellow, CURO Research Assistant
Dr. William Finlay, Sociology, Franklin College of Arts and Sciences

This research investigates the presence of South African wineries in US wine markets as well as what factors may influence that presence. Using a dataset consisting of stores in the US that sell different wines from South Africa, my research mentor and I analyzed the market presence of the different wineries. Initial results appear to indicate that the US market for South African wines is a "winner-take-all" market in which a few wineries vastly outweigh the other wineries both in market presence as well as volume of wine sold. Unlike many other "winner-take-all" markets, this one does not consist of a few large wineries dominating the smaller ones; instead, it consists of many small wineries competing against other small wineries. Our research seeks to explain why such a market exists. We also use data about wine quality, as established by *Platter's Wine Guide*, to argue that quality ratings have a negligible impact on market presence. Initial results of our analysis appear to indicate that the most important factor in winery market presence is what distributor each winery is connected to.

Reducing School Discipline Disparities and Excesses in K-12 Education in the State of Georgia

Kavi Pandian, Foundation Fellow, CURO Research Assistant
Dr. Sarah Shannon, Sociology, Franklin College of Arts and Sciences

This policy research investigates the high rates of discipline in public schools in Georgia as well as the ways in which this discipline is administered unequally based on characteristics such as race, gender, and ability status. After conducting a review and analysis of relevant literature and research, some root causes have been identified for why these rates of discipline are so high and disproportionately affect students of color and students with disabilities. These include implicit biases from teachers who do not understand the culture of their students, undiagnosed medical issues, undiagnosed behavioral issues, and psychological characteristics inherent in developing children. To address these causes, three policy alternatives were developed: a policy proposing the implementation of restorative justice practices in schools and school districts throughout Georgia, an optical health medical intervention policy modeled after one which has been implemented in Florida, and a policy calling for changes in record-keeping and other bureaucratic measures to increase accountability and reduce rates of discipline for vague, undefined offenses. After analyzing effectiveness, feasibility, and the costs and benefits of each policy, this policy paper asserts that working to implement restorative justice in districts and schools throughout the state is the best option to reduce school discipline disparities and excesses in the state of Georgia.

Identity, Cosmology, and Subsistence in Madagascar

Rose Parham, CURO Research Assistant
Dr. Bram Tucker, Anthropology, Franklin College of Arts and Sciences

Southwestern Madagascar is characterized by one of the most inconsistent and variable climates in the world. This high degree of unpredictability would seemingly indicate a need for humans living in the area to reduce subsistence risks associated with high variability by diversifying subsistence strategies and increasing mobility, but in this region of Madagascar, ethnic identity relates to subsistence strategies, which limits economic diversification, and religious cosmology involves ancestor reverence, which limits mobility. These limiting cultural traits seem as if they would be maladaptive due to the high subsistence risk associated with this region. This research will explore whether these cultural traits are most likely regional adaptations versus traditions shared widely throughout Madagascar. This will be accomplished using a cross-cultural dataset of cultural groups throughout Madagascar. The research will compile previously published data from various cultural groups across Madagascar, which will then be compared using frequency statistics such as chi-squared analysis. Findings are suspected to suggest that while there is some cosmological variability across Madagascar, it stays fairly consistent across the island. Ethnic identity is expected to be more variable, especially with the unique trait of identity being related to subsistence strategy in southwestern Madagascar. On a broader scale, this research explores different ways in which humans can adapt to various environments, as well as how culture and socioreligious institutions affect the ways that people interact with their environment.

Effect of Different Concentrations of 25-Hydroxycholestrol on Osteogenic Differentiation of Mesenchymal Stem Cells (MSC) from Broiler Compact Bone

Diane Park, CURO Research Assistant
Dr. Woo Kyun Kim, Poultry Sciences, College of Agricultural and Environmental Sciences

MSC are multipotent progenitors that can differentiate into various tissue cells. The objectives of the study were to 1) isolate MSC from broiler compact bone and 2) study the effects of 25-hydroxycholestrol on osteogenic differentiation of MSC. This is important for the production and welfare facets of the poultry industry as chickens develop orthopedic problems such as lameness, tibial dyschondroplasia, and osteoporosis. MSC were isolated from the femurs and tibia of day-old chicks and left to confluent, with the media changed every 2-3 days. The cells were passaged until P4 and plated in 24 well plates at density of 20,000 cells/cm^2. Upon confluency, cells were treated with the following treatment: control, osteogenic media (OM), and OM with 0.5, 1, and 2 uM 25-hydroxycholesterol. Cytochemistry conducted on day 7 and 14 to detect osteogenesis. Cells treated with OM, and 25-hydroxycholestrol induced higher proportion of Alizarin Red and Von Kossa stain (mineralization), and Alkaline Phosphatase (early osteogenic marker) compared to control cells. However, 2uM 25-hydroxycholesterol was toxic to cells, causing cell death. Results indicated that 25-hydroxycholesterol has a stimulatory effect on MSC ostegenesis. Current results provide rationale for further study on regulatory mechanisms of 25-hydroxycholesterol on MSC which can help to address skeletal problems in poultry. RNA extraction then RTPCR will be conducted at 7 and 14 days to analyze gene expression and obtain a broader understanding of the effects of 25-hydroxycholesterol on MSC. A positive result will show a significant expression of pathways activated by osteogenesis such as BMP and BGP.

The Isolation of *C. elegans* Germ Cell Line

Yeonsoo Park, CURO Research Assistant
Dr. Edward Kipreos, Cellular Biology, Franklin College of Arts and Sciences

The nematode *Caenorhabditis elegans* is one of the most important model systems for biological research. Despite many advantages of *C. elegans*, it lacks a critical tool - there are no *C. elegans* cell lines. Germ cells that are isolated from tumorous germline mutants can be maintained in a tissue culture media that was created by the Kipreos laboratory. However, the germ cells do not divide continuously, which is a requirement for generating an immortal cell line. This study focused on testing different mutant combinations in order to isolate a continuously-dividing germ cell line. We tested two different combinations of tumorous *C. elegans* mutants: glp-1(ts/gf); cki-2(lf); daf-16(lf); and glp-1(ts/gf); cki-2(lf); daf-16(lf); let-60(gf). We compared how effectively germ cells from these two different mutants can proliferate

in the tissue culture media. To carry out the experiments, the mutant strains were disrupted to release their germ cells, and then the germ cells were transferred to tissue culture media. The ability of the cells to proliferate was followed by measuring the level of DNA in the culture over time. To measure DNA levels, we set up a DNA quantitation assay using the fluorescent DNA stain Hoechst 33342, which was analyzed with a fluorometer. The level of DNA in the culture was measured as the cells were incubated over several days. The study also tested the effect of bacterial folates, which are a germ cell stimulatory signal, on the ability of the cells to replicate over time.

Implicit Subjectivity Assessment and Guilt-Shame Proneness in Work-Family Conflict, Family-Work Conflict and Workaholism

Dillon Patel, CURO Research Assistant
Dr. Malissa Clark, Psychology, Franklin College of Arts and Sciences

Workaholism, work-family conflict, and family-work conflict are emerging topics of profound interest and endless possibilities. Current studies on these topics have been largely limited to studying a small number of antecedents and the reliance on assessing self-reported perceptions of work-family conflict and family-work conflict. Though these forms of study have been able to yield interesting and powerful results, there is an implicit subjectivity in assessing one's own perception of workaholism, work-family conflict or family-work conflict. As such, this study aims to evaluate the validity of a behavioral checklist assessment, which would mitigate subjectivity, in relation to the pre-existing subjective work-family conflict, and family-work conflict measures. In addition, this study aims to investigate guilt/shame proneness, an antecedent that has yet to be investigated in consideration with workaholism, work-family conflict, or family-work conflict. Data collection has been completed through a Qualtrics questionnaire with a sample size of 300 working class adults. We anticipate that the behavioral work-family and family-work checklists will be positively related to self-perceptions of work-family and family-work conflicts. Additionally, we anticipate that guilt/shame proneness will be positively correlated with workaholism, in that individuals that feel a higher degree of guilt or shame are more likely to feel guilty for not devoting themselves to work enough.

Task Allocation between Established and Impromptu Dyads: A Test of the Transactive Goal Dynamics Theory

Divya Patel
Lindsay Burr, Grant Butschek
Dr. Michelle R vanDellen, Psychology, Franklin College of Arts and Sciences

The transactive goal dynamics theory suggests that the compatibility of a couple is characterized by their ability to allocate tasks when pursuing their goals, rather than by having similar traits or values. More compatible couples should have higher efficiency in task allocation, resulting in better goal outcomes and higher relationship satisfaction. In our research, we examine how relationship partners and random pairs of individuals allocate tasks when pursuing a shared goal. In the experiment, researchers invite two couples to each session and inform them that they are to complete a series of tasks as well as a questionnaire about the nature of the couple's relationship. This experiment is a 2x2 design in which researchers randomly assign participants, firstly, to be either on a team with their relationship partner or with an impromptu partner from the other couple, and secondly, to choose their own tasks to complete or receive designated task assignments from the researchers. In the free choice condition, participants allocate sixteen tasks, including darts, dancing, anagrams, and mental math between themselves and their partner in an attempt to maximize their total score. Tasks in assigned conditions are yoked on basis of previous participant choices. Data collection is ongoing and predicted results will be presented. We hypothesize that established relationship partners will be able to allocate tasks more effectively and efficiently than random pairs of individuals and this superior performance will be dampened when the tasks are assigned (i.e., not chosen by participants).

Cytotoxic Effects of Novel Compounds on Clinically Challenging Cancer Cell Lines

Hiral Patel, CURO Research Assistant

Dr. Mandi M Murph, Pharmaceutical and Biomedical Sciences, College of Pharmacy

Current therapeutic options aimed at cancer diagnoses include targeted therapy, immunotherapy, surgery, chemotherapy, and radiation to eliminate the present tumors. Each class of drugs strives to combat the cancer cell's ability to hijack their surrounding healthy systems, and therefore, a multifactorial approach to patient therapy is often ideal. However, 70% of patients do not respond to initial chemotherapy and the five-year survival rate for patients who display resistant behavior ranges from 10 to 30%. Cancer cells are able to prevent drug influx and therefore, buildup of chemoresistance often results in therapeutic failure. In this study, the cytotoxic effects of the provided compounds on are observed. We hypothesize that exposure of various melanoma and ovarian cancer cell lines to these potential cytotoxic compounds will greatly reduce cell viability, and possibly yield a novel therapeutic agent to combat malignant tumor growth. Alterations of functional groups on the original set of compounds may also enhance or decrease cytotoxic effects and is currently being explored through creating variations of successfully tested candidates. We utilized cytotoxicity assays depicted as dose response curves to represent our results and determine IC_{50} and statistical values. The three most effective compounds were D5, D9 and C2 as a majority of their IC_{50} values fell under the ideal 10 μM across the different cell lines. For future work, we plan to continue testing variations of the three successful compounds to yield the most potent candidate for in vivo testing.

Building the Genetic Tools to Make *Methanococcus Maripaludis* the Next-Generation Model Chassis for Biochemical Production

Hirel B Patel, CURO Research Assistant
Ben Park, Kyler Herrington, Ghazal Motakef
Dr. William Whitman, Microbiology, Franklin College of Arts and Sciences

Current bacterial chassis use expensive sugars as feedstocks, which limits profitability. Using the archaeal model *Methanococcus*, we are developing an archaeal chassis that feeds on inexpensive CO_2 and H_2 or formate instead of sugars, for next-generation biochemical productions. Our team is developing tools and methods for modulating protein expression in *M. maripaludis*, an archaeal model. Our focus is engineering the Ribosomal Binding Site (RBS). We use a mCherry reporter developed by our team previously to measure protein expression levels in a library of RBS mutants. We are now working to (1) determine the effects of mutations in the spacer region and the role of mRNA secondary structure, (2) expand our Archaeal Interlab study to encourage more iGEM teams to collaborate with us and standardize our fluorescence measurement protocol, and (3) continue metabolic modeling to evaluate the effect of alternate carbon sources on cell growth and geraniol production in *M. maripaludis*.

A Method for Enrichment of Maize Stem Cells and Leaf Primordia

Krishna Patel
Eva Lauren Rodriguez
Dr. Xiaoyu Zhang, Plant Biology, Franklin College of Arts and Sciences

Plant development is characterized by continuous organ formation and growth throughout the life cycle. This is primarily achieved via two small groups of self-renewing stem cells at the shoot and root apical meristems (SAM and RAM, respectively). In the SAM, stem cells are maintained in a central zone and daughter cells move laterally to peripheral zones where they differentiate into lateral organs, such as leaves. Despite the biological importance of plant stem cell maintenance and differentiation, the underlying mechanisms of stem cell self-maintenance and differentiation remain outstanding questions in plant biology. This gap in our understanding derives largely from the technical difficulty of performing chromatin analyses on the small number of cells in the SAM. To resolve this gap, we will use cell-type specific fluorescent lines, coupled with fluorescence-activated cell sorting, to acquire homogenous samples of stem cells and cells of young leaf primordia. We plan to use the Assay for Transposase-Accessible Chromatin (ATAC) to map accessible chromatin and transcription factor binding sites genome-wide. The ATAC-seq uses a hyperactive Tn5 transposase to insert Illumina sequencing adapters into sterically accessible

DNA, which will provide a genome-wide map of open chromatin. We have confirmed the presence of SAM- and leaf primordia-specific fluorescence in transgenic maize lines and we are optimizing a method for dissecting SAMs and processing for fluorescence-activated cell sorting.

Substrate Specificity of the Lactoperoxidase/Thiocyanate/Hydrogen Peroxide Cell-Free System to Inactivate Influenza Virus

Urmi Patel, CURO Research Assistant
Dr. Balazs Rada, Infectious Diseases, College of Veterinary Medicine

Influenza virus (IV) is a deadly pathogen that has the ability to affect large populations by infecting the airways. NADPH oxidase family's Dual Oxidase 1 has shown to play a role in antiviral defense through the production of hydrogen peroxide (H_2O_2) in tracheal airways. Lactoperoxidase (LPO), an enzyme present in tracheal airways, uses H_2O_2 to oxidize thiocyanate ions (SCN^-) into antimicrobial hypothiocyanite ($OSCN^-$). A similar reaction is seen in the formation of hypoiodous acid (HOI). Our previous work has shown that $OSCN^-$ inactivates Influenza A virus (IAV) H1N2 strain in a cell-free system where H_2O_2 is not generated by Duox1 but by the glucose/glucose oxidase system. To further confirm the hypothesis, rat tracheal cells were infected with different strains of IAV and Influenza B virus (IBV) in combination with SCN^-, I^- and LPO. Once the supernatants were collected, they were used to perform plaque assays. These antimicrobials resulted in viral inactivation of both IAV and IBV. The data obtained indicated several log reductions of infective virus via inactivation in the 3 component systems (LPO, I^- and SCN^-). Per the comparisons between I^- and SCN^-, in the cell-free system, IAV strains, such as H1N1 and H1N2 displayed higher susceptibility to HOI than $OSCN^-$ substrate. However, IBV displayed a greater inactivation by the $OSCN^-$ substrate compared to the HOI substrate system. These differences seen could lead to future studies that would develop our knowledge of the Duox1 system and enhance applied research in the direction of possible treatments of IAV and IBV.

Photodissociation of Carbon Monosulfide in Interstellar Environments

Ryan Pattillo, CURO Research Assistant
Dr. Phillip C Stancil, Physics and Astronomy, Franklin College of Arts and Sciences

Photodissociation occurs when a molecule absorbs a photon of light and breaks apart into separate atoms or molecules. The molecule is initially rotating and vibrating at a certain energy level, and it transitions to an excited, unbound state upon absorbing the photon. This process is a major source of molecular destruction in a variety of interstellar environments with a strong radiation field such as circumstellar disks, protoplanetary disks, and diffuse and translucent clouds. To reliably estimate the abundances of molecules in these regions, it is important to have accurate photodissociation rates. Typically, photodissociation rates for a molecule are computed for transitions from only its ground rotational-vibrational level. For the carbon monosulfide (CS) molecule, we instead compute photodissociation cross sections for transitions from several thousand rotational-vibrational levels to six excited molecular states. This yields comprehensive cross sections which can be applied to calculate accurate photodissociation rates in a wide range of interstellar environments. We achieve this computationally using a two-state quantum perturbation approach. A detailed look into the modeling of this process, as well as some example applications of the cross sections, is presented.

Cambodian Mental Health Therapists' Experience in Clinical Supervision: A Phenomenological Exploration

Amanda Peclat-Begin, CURO Research Assistant
Dr. Desiree M Seponski, Child and Family Development, College of Family and Consumer Sciences

Decades after the Khmer Rouge genocide in Cambodia, the country is still continuing to develop and rebuild, including mental health treatment services. While there is extensive research on mental health attitudes, practices, and treatments with Cambodian refugees around the world, there has been a lack of focus on the effectiveness of therapies in native Cambodia or

Cambodian therapist's personal experiences in providing mental health treatment. Psychotherapy is a field that is highly stigmatized, unregulated, underfunded, and still developing in Cambodia. In 2011, the first cohort of therapists graduated from the Royal University of Phnom Penh's Master's program in clinical and counseling psychology, which is currently the only program of its kind in the country. Given the influx of newly trained therapists and implementation of mental health treatments, it is important to understand their experiences of psychotherapy and how treatments can be made more culturally responsive. This study explores the psychotherapy practice experiences of Cambodian therapists, and their utilization of clinical supervision. Thirteen practicing therapists were interviewed in the winter of 2015-2016 and asked about their experiences practicing therapy and receiving supervision, usually from a supervisor not native to Cambodia. Preliminary analysis of the data show that while supervision is usually regarded as a positive experience for therapists, there are some difficulties that commonly arise. Issues understanding one another (as sessions are conducted in English) and a lack of cultural understanding of Cambodian culture could lead to discouragement among the therapists. As the first ever certification course for clinical supervision in Cambodia is currently in progress of development, data driven suggestions for a culturally responsive approach to supervision for non-Cambodian supervisors are explored.

Variation in Egg Development in Deceased *Extatosoma tiratum* Females

Linden Pederson, CURO Research Assistant
Dr. Marianne Shockley, Entomology, College of Agricultural and Environmental Sciences

Through the dissection of a deceased female *Extatosoma tiratum* (a large species of phasmid endemic to Australia) it became apparent that the specimen has a multitude of eggs in her ovarioles and ovipositor that had yet to be laid, and presumably would have been laid had the female not died. In this study ten deceased female *Extatosoma tiratum* will be dissected in order to examine their ovarioles and the eggs arranged in their ovipositor. Previous research shows that there is considerable variation in the developmental rates of embryos in eggs that have already been laid. Despite this, I anticipate a distinct level of internal development of the eggs in the females' ovipositors — that there is a certain developmental point eggs must reach before being laid. The internal structure of the eggs in the ovipositor will also be compared to the eggs which are of similar exterior development located in the females' ovarioles. This comparison will be used to discern if there is a difference between the development of eggs that would have been laid imminently and those that would have been laid at a later date had the female not died. Better understanding the nature of reproduction of this species will hopefully maximize their fecundity as well as promote the health of colonies reared in labs and zoos.

Do Changes in the Quality and Quantity of Leaf Litter Inputs Affect Growth Rates and Emergence of Stream Macroinvertebrate Consumers Following Reach-Scale Removal of Rhododendron?

Reed Peloquin, CURO Research Assistant
Dr. Catherine Pringle, Ecology, Odum School of Ecology

Rhododendron is a locally invasive shrub that grows along small southern Appalachian streams that inhibits the growth of other riparian vegetation. The USDA Forest Service is experimenting with removing this shrub along several streams in the Wine Springs watershed in the Nantahala National Forest of North Carolina in order to promote the growth of hardwoods. This study focused on two second-order steams, Kit Springs and Holloway. Kit Springs was treated as a reference stream, while Rhododendron at Holloway was cut and piled away from the bank and herbicide was used to inhibit growth of Rhododendron stumps. Rhododendron leaves are of lower quality than hardwood litter, and removal of this riparian shrub could affect the quality of leaf litter resources in streams, affecting stream macroinvertebrates that feed on leaf litter. When stream insects metamorphose into their adult winged forms to reproduce, they also provide an important food source for terrestrial predators. Removing Rhododendron from the riparian zone could have several effects on stream insects that consume leaf litter. Low-quality Rhododendron leaves have been shown to reduce the growth

rates of insect consumers, while high-quality litter (contributed by hardwood trees recruited after Rhododendron removal) may increase growth rate of insects that consume leaf litter. Excessively high growth rates have been shown to cause insects to develop faster and emerge at smaller sizes. This could cause a desynchronized emergence, with a portion of the population emerging before the rest of the population does in a usual mass emergence. Other studies of desynchronized emergence have observed that early emergence is dominated by males, potentially interfering with later-emerging females finding mates and affecting reproductive success. The potential for these effects will be explored by examining the size distribution of populations of two different insect taxa: *Tallaperla maria* and *Pycnopsyche sp*. in stream reaches where Rhododendron has been experimentally removed. We hypothesize that desynchronized emergence will occur in the Rhododendron removal reach, with individuals emerging early in the emergence window at a smaller size than individuals from the reference stream.

Using Syndemics Theory to Examine the Correlation between Wealth, Disease Knowledge, and Zoonotic Diseases in Panama

Kara Pemberton, CURO Research Assistant
Dr. Susan Tanner, Anthropology, Franklin College of Arts and Sciences

Syndemics are defined as "two or more afflictions acting synergistically, contributing to excess burden of disease in a population" (Merrill Singer. 2009. *Intro to Syndemics*.) Historically the term has been used to describe interactions of diseases and social conditions such as Substance Abuse, Violence, and AIDS (SAVA), but syndemics may also be a useful framework to examine synergistic interactions between wealth, humans, and zoonotic diseases. This paper draws on previously collected data from a collaborative project in Panama that investigated two zoonotic diseases (Chagas disease and American leishmaniasis) in six rural communities. Data analysis will examine correlations between a person's knowledge of zoonotic diseases, socioeconomic condition, and access to health care infrastructure. This will involve several measures of household economic status, results from a knowledge test of zoonotic disease, and the presence of a community health post. Preliminary analysis suggests an association between household wealth and disease knowledge. Health is a holistic thing that extends beyond the body, to the physical, social and economic environment in which we live. Syndemics are a starting point for understanding how that environment affects the body. Negative social conditions can weaken our bodies and exacerbate disease, and treatment should involve preventative care of conditions making our bodies vulnerable. Further research into how a government can manage syndemics, through funding policies, health care resources, or other methods, will help inform global health policy.

Parental Support for Autonomy as a Predictor of Anxious and Depressed Behaviors in Elementary School Children

Julia Marie Petros
Chantal Van Landeghem
Dr. Anne Shaffer, Psychology, Franklin College of Arts and Sciences

Previous research has consistently demonstrated the positive influence of parental support for autonomy on children's psychosocial development. Findings are mixed regarding the relationship between support for autonomy and child internalizing problems, however. For the current study, we hypothesized that parental support for autonomy would be negatively correlated with child internalizing problems, and this relation would be mediated by the child's emotion regulation. The study used a diverse community-based sample of 64 children, ages 8-11, and their mothers. Measures of autonomy support were obtained through observations during a series of interaction tasks, child anxious/depressed behaviors and emotion regulation were assessed via parent report (CBCL, ERC). Multiple regression analyses were used to test the mediation model. Partially consistent with the hypotheses, maternal support for autonomy did not directly predict internalizing problems (B=.39, SE=.35, CI =-.30 to 1.09), but it did have a significant indirect effect, with child emotion regulation acting as a significant mediator (B=-.20, SE=.13, 95% CI =-.56 to -.01). The mediation model was not significant when child gender and maternal education were included as covariates,

however. Because maternal support for autonomy does not appear to be a direct predictor of young children's internalizing problems but still plays a role in child outcomes, future studies should analyze related maternal behaviors that may interact with support for autonomy to impact child development. It may also be that support for autonomy is more relevant at older ages, such as adolescence, suggesting a need for longitudinal research.

Mechanisms of Drug Resistance Based on Computational Studies of Taxol

Amanda Pham, CURO Research Assistant
Darby Lyle Woodling, Marisa Stewart
Dr. Paul Xie, Electrical and Computer Engineering, College of Engineering

Microtubules are known to have a dynamic intracellular structure that is involved in a variety of cellular mechanisms including intracellular transportation, structure stability and cell division. From previous research on this important molecule, microtubules have been found to be primarily correlated with developments of cancer and chemotherapy resistance. Further studies have found a breakthrough anticancer drug, Paclitaxel, which targets to the "Taxane site," on the β-tubulin heterodimer structure that aids in creating the overall microtubule structure. As a result, this has provided multiple advancements for treatment of several tumor cancers. However, drug resistance is a major challenge associated with Paclitaxel and for the overall response and survival of cancer patients. Microtubules play a major role as drug targets in cancer treatment due to their key role in cell division. Understanding the binding of Paclitaxel and the interactions between Paclitaxel and its binding residues is important for revealing the mechanisms of drug resistances and identifying new drugs. However, the determined structures have bad resolution which caused arguments to the overall "binding pattern." In this research through computer drug discovery, we have applied ligand docking on tubulin proteins through a specialized program, Schrodinger, and will compare the docking structures from our projected list of tubulin proteins. Our predicted results will provide new evidences for the disagreement of binding conformations and the mechanisms of observed drug resistances.

A Look into the Contents of Faculty Learning Community Meetings of STEM Professors

Jamie Pham
Dr. Paula Lemons, Biochemistry and Molecular Biology, Franklin College of Arts and Sciences

US policy makers and education researchers are calling for college biology professors to adopt new teaching strategies that include the use of assessment data in teaching decisions. To do so, a number of biology professors have joined a project called Automated Analysis of Constructed Responses (AACR). In this project, the professors incorporate pre-made AACR questions into their classroom. AACR questions are constructed-response questions focused on key concepts in biology that can be analyzed by a computer. After sending off their students' results, faculty receive an AACR report that shows them the student misconceptions. Seeing these data allows faculty to modify their teaching in order to address the misconceptions. In order to learn to use AACR, these faculties participate in faculty learning communities (FLCs), where they have the opportunity to discuss various topics related to the project with their colleagues. This paper reports on the investigation of AACR FLCs at six institutions and focuses on the research question, "How is time utilized during AACR FLC meetings?" FLC meetings are studied from transcripts of audio recordings. The transcripts are analyzed using qualitative content analysis to identify meeting topics and emphases. These analyses reveal that each AACR FLC spends their meeting times differently to accommodate the group's needs. This new knowledge is important because it allows greater insights into faculty teaching obstacles, their thoughts on teaching and learning, and their motivations for changing their teaching style. This knowledge will assist in the development of future professional development opportunities.

Animism and Foraging Economies

Matt Pieper
Dr. Bram Tucker, Anthropology, Franklin College of Arts and Sciences

This research will test recent anthropological claims that "animism" or "perspective cosmology"

(in which humans, animals, and plants have similar souls) is either an adaptation to a foraging economy or a cultural tradition shared amongst Native American societies. The hypothesis will be tested through cross-cultural analysis of indigenous North American cultures and foragers from Africa. The research will use existing published data as well as data collected from individual research participants. Participatory data collection was deemed necessary as preexisting ethnographic information proved to be insufficient. Africa was chosen as a cross-cultural reference point due to a comparable presence of foraging economies; an imperative parallel in identifying potential cross-cultural patterns. These patterns, if observed, have the ability to further contribute to substantive discussion regarding the topic of psychic unity v. cultural relativism in regards to human behavior. I anticipate that the data will reflect a trend in which animism is shown to be associated with foraging economies and not a cultural adaption unique to the indigenous peoples of North America.

Effect of Sample Collection at Various Collection Sites on the Detection of *Mycoplasma synoviae* by Real-Time PCR

Stephanie Alexandra Pierre
Dr. Naola M Ferguson-Noel, Population Health, College of Veterinary Medicine

Mycoplasma synoviae (*MS*) is a prevalent and economically significant poultry pathogen, causing respiratory tract infections and infectious synovitis. Tracheal swabs are considered the standard collection site for sampling to detect *MS* by culture or PCR but various sites in the upper respiratory tract have been used to detect avian *Mycoplasma spp.* and other respiratory pathogens in commercial poultry. It is important to identify which of the collection sites produces optimal PCR results when performing diagnostic tests, to ensure that *MS* is rapidly and correctly identified for the protection of poultry breeding flocks. The objective of this study was to compare the detection of *MS* by quantitative real-time PCR (qPCR) from three collection sites (trachea, choanal cleft and ororphaynx). Two groups of broiler-type chickens were inoculated with different strains of *MS* (a virulent strain and a potential vaccine strain) and sampled. The qPCR results (mean Ct values and MCNlog10) showed that all three of the sampling sites were appropriate for PCR, as there were no significant differences ($P< 0.05$) with respect to percent positives or MCNlog10 among the sites. Overall the tracheal swabs had the stronger PCR results leading to the conclusion that it should remain the standard for research purposes.

Promotion, Patronage and Merit in the Royal Navy during the Napoleonic Wars

Stephen Robert Pokowitz, CURO Research Assistant
Dr. Jennifer Palmer, History, Franklin College of Arts and Sciences

Naval promotion during the Napoleonic Wars in the Royal Navy started shift away from the Captain's List towards more merit based promotions that allowed the Royal Navy to maintain naval superiority against other European powers. An analysis of how prevalent merit based promotions were, along with an analysis on the success of these early promotions, will be based on a collection of primary and secondary sources. The primary sources will consist of letters and dispatches from leading figures within the Admiralty and publications such as the *Naval Chronicle* and the *London Gazette*, which had a large impact on public opinion and advancement. The secondary sources will be drawn from academic books and will allow for a more broad analysis on specific cases and the overall impact of merit promotion. The research has shown that merit promotions were a mixed bag, with the Captain's list becoming more irrelevant in favor of merit promotion, but also that merit promotion wasn't always used on deserving Commanders. This shift might also be seen as a response to the individualism of the French Revolution. The shift more toward merit promotion was the start of more professional modern militaries that placed less emphasis on social status and more on ability.

Investigating the Use of mRNA Transfection to Treat Hypophosphatasia

Trey Powell, CURO Honors Scholar, CURO Research Assistant, CURO Summer Fellow
Dr. Luke Mortensen, Animal and Dairy Science, College of Agricultural and Environmental Sciences

Hypophosphatasia (HPP) is a rare genetic disease that impairs the process of bone mineralization due to low activity of tissue-nonspecific alkaline phosphatase (TNAP). Severe hypophosphatasia also manifests with complications including hypercalcemia, vitamin B6-dependent seizures, and craniosynostosis. Many patients suffering from these symptoms die from respiratory failure. Other forms of HPP include perinatal, childhood, adult, and odonto-HPP with symptoms ranging from stillbirth to loss of teeth. Current treatment for HPP, enzyme replacement therapy, hinders the livelihood of HPP patients, as it requires daily intravenous treatment, and does not impact craniofacial or tooth defects. Mesenchymal stem cells derived from bone tissue have shown promise to treat HPP with a low allogenic transplantation rejection rate, and yield increased bone mineralization and muscle mass in patients. To enhance mesenchymal stem cell (MSC) therapy as a treatment for HPP, I studied the application of mRNA transfection in MSCs using the CRE lox system. The transfection of mRNA may be used to alter protein expression in therapeutic MSCs to increase cell production of alkaline phosphatase or enhance transplanted cell engraftment. Here, mRNA transfection was used to express fluorescent proteins. Three experiments analyzed the transfection optimization and indicated that 1:3 and 1:5 mRNA to transfection reagent ratios produced the greatest overall cell fluorescence. Our results indicate the power of mRNA transfection to alter MSC behavior, which will be useful for in vitro and in vivo studies.

An Investigation into the Dynamics of Faculty Learning Communities

Briel Power, CURO Research Assistant
Dr. Paula Lemons, Biochemistry and Molecular Biology, Franklin College of Arts and Sciences

A growing emphasis on reform in US higher education has led many college faculty members to consider changing their teaching strategies. In particular, many are now implementing active learning, which consists of teaching methods that encourage students to cognitively engage with the material during class. Research focuses on the dynamics of Faculty Learning Communities (FLCs) and their use as professional support for the implementation of active learning strategies in undergraduate science courses. The FLCs under investigation arose through a multi-institutional project known as Automated Analysis of Constructed Response (AACR). AACR provides data to faculty about their students' thinking. AACR FLCs support faculty in understanding the data-heavy AACR reports and how to modify teaching accordingly. Transcripts of FLC meetings from multiple institutions are analyzed by qualitative content analysis, which involves exploring the transcripts for thematic patterns. These data reveal the interests and perceptions of AACR FLC participants. This knowledge will lead to improved professional support for faculty groups and should and may improve the implementation of active learning strategies in the undergraduate classroom.

The Persistence of Small Pollen Grains in Populations of *Ipomoea purpurea*

Darien Power, CURO Research Assistant
Dr. Shu-Mei Chang, Plant Biology, Franklin College of Arts and Sciences

This research project uses the common morning glory flower, *Ipomoea purpurea*, to examine how different pollen grain sizes contribute to male reproductive success. This is important since most studies examine female fitness only. The Chang laboratory found previously that when large and small pollen grains are in direct competition in greenhouse experiments, large pollen grains fertilize more ovules than small ones. The current project investigates whether or not this remains true when the flowers are exposed to natural pollinators. The plants used in this study were from artificially selected lines that diverge in pollen size and were naturally pollinated by bees. These samples were allowed to flower naturally so that the flower number represented the normal display size. The seeds produced from this pollination array study were collected and planted in the greenhouse. Once these seeds grew, I collected leaf tissue samples from 84 individuals and extracted their DNA using a modified CTAB protocol. Polymerase Chain Reactions for seven different microsatellite loci were run on each individual. I conducted paternity analyses on the computer to determine whether the paternal parent was a large- or small-pollen parent. Contrary to the greenhouse results, I found that small pollen grains were more reproductively successful than large ones. This result points to

the importance of understanding why we see different patterns in greenhouse experiments and field studies. It also contributes to our understanding of why both large- and small-pollen grains are produced in natural populations.

Chikungunya Virus-Like Particles Vaccine Formulations that Elicit Balanced Th1/Th2 Response in Mice

Matthew Prellberg, CURO Research Assistant
Dr. Ted M Ross, Infectious Diseases, College of Veterinary Medicine

Chikungunya virus (CHIKV) is a mosquito-borne alphavirus that is responsible for large epidemic outbreaks in South-East Asia, India, Europe, and recently the Americas. CHIKV causes severe fever, rash, and joint pain, and represents a serious public health threat in countries where *Aedes spp.* mosquitoes are present. Vaccination remains the best strategy to prevent most vector-borne diseases, as they offer means to induce rapid and long-lived immunity with negligible risk of serious adverse reactions. In order to develop such a vaccine to protect against CHIKV infection, we developed CHIKV virus-like particles (VLPs) produced in insect cells by recombinant baculoviruses. We then paired them with different adjuvants aimed at modifying VLP's T-helper (Th) cell polarization to induce a balanced Th1/Th2 response, which is believed to be productive against chronic infection. Vaccine candidates will be tested in mouse models of CHIK infection and will be evaluated for immunogenicity and protection. CHIKV antigen-specific antibody responses in immunized C57BL/6 mice were determined using ELISA. We are interested in measuring mouse total IgG, IgG2c, and IgG1 antibody responses against CHIK VLP antigens paired with differing adjuvants. Measured IgG2c and IgG1 antibody ratios will be used to evaluate Th1 vs. Th2 response for vaccine candidates respectively. The final vaccination-challenge in mice against wild type CHIK infection will be done to examine vaccine efficacy. Vaccines displaying balanced IgG2c and IgG1 antibody ratios are hypothesized to stimulate superior protection.

Metabolic Responses to Diets of Varying Fatty Acid Saturation

Leah Nicole Prine , CURO Research Assistant
Dr. Jamie A Cooper, Foods and Nutrition, College of Family and Consumer Sciences

Studies show that composition of dietary fats has differential influences on fat oxidation, playing a role in obesity. Determine the effects of a high-fat (HF) diet rich in either poly-unsaturated fatty acids (PUFAs) or mono-unsaturated fatty acids (MUFAs) on fat oxidation. Fifteen normal weight men (18-45 years) completed a randomized, cross-over design of 2 feeding trials. Each trial included a 3 day lead-in diet, pre- and post-diet study visits, and a 5 day HF diet. 5 day diets were rich in either cottonseed oil (PUFA) or olive oil (MUFA). During the 2 study visits (before and after the 5 day diet), indirect calorimetry was used to measure fasting respiratory exchange ratio (RER) and substrate oxidation. There was a two week washout period between trials. Area under the curve (AUC) was calculated and used to assess differences within groups. RER AUC decreased significantly from pre to post in the PUFA-rich diet (pre=0.85 ±0.06units/h, post= 0.83 ±0.03units/h), but not in the MUFA-rich diet (pre= 0.84 ±0.06units/h, post=0.83 ±0.05 units/h). Fat oxidation AUC increased significantly from pre to post in the PUFA-rich diet (pre= 8.9±0.7 g/8h, post= 10.5 ±0.4 g/8h), but not in the MUFA-rich diet (pre= 10.0 ±0.7 g/8h, post=10.5 ±0.7 g/8h). Significance was expected at $P< 0.05$. Chronic ingestion of a PUFA-rich HF diet may decrease RER (indicating higher fat oxidation) in normal weight men whereas a MUFA-rich diet does not have the same effect.

In Vitro Activity of Gallium Maltolate against Drug-Resistant *Rhodococcus equi*

Maggie Pritchett
Dr. Steeve Giguere, Large Animal Medicine and Surgery, College of Veterinary Medicine

Rhodococcus equi is a Gram-positive bacterial pathogen causing severe pneumonia in foals. Recently, emergence widespread resistance to macrolides and rifampin, the two types of antibiotics currently used to treat infection caused by *R. equi*, has become a major problem facing the horse industry. The only viable long-term approach to prevent emergence of resistant *R. equi*

will be to decrease widespread use of commonly used antibiotics in foals. Gallium maltolate (GaM) is a semi-metal that is active against many types of Gram-positive bacteria. If GaM proves to be active against *R. equi*, its use in infected foals might be a way of decreasing selection pressure for antibiotic resistance. The objectives of this study were to compare the in vitro activity of GaM to that of other antimicrobial agents against R. equi and to determine if exposure of *R. equi* to GaM in vitro will select for resistance. The minimum inhibitory concentration (MIC) and the mutant prevention concentration (MPC) of GaM, macrolides, and rifampin were determined for both antibiotic susceptible (n= 30) ant antibiotic resistant (n=30) isolates of *R. equi*. Gallium was active in vitro against all isolates of *R. equi* with a median MIC of 8 μg/mL (range 4 to 32 μg/mL). However, the MPC was ≥ 512 μg/mL, indicating that resistance to GaM occurs readily in vitro. Additional in vivo studies will be required before GaM can be used for the treatment of pneumonia caused by *R. equi* in foals.

No Longer Used: Designing Non-Exploitative Communication for Organizations Seeking to End Human Trafficking

Emma Katherine Protis, CURO Research Assistant
Dr. Maria Len-Rios, Journalism, Grady College of Journalism and Mass Communication

A common approach nonprofits use in developing external communication to publics is to stress emotional detail and capture the intense circumstances of the people they serve. At times, this results in over-portraying elements of pity and helplessness regarding these circumstances. This can be an effort to generate funds or support from the general public. Even so, when this is the predominant tone for all storytelling, it can exploit the survivors, even if unintentional. This research seeks to answer how to effectively conduct external communications for nonprofits seeking to end human trafficking without exploiting the survivors. This study takes a novel approach using theory to design ethically responsible communication. It focuses primarily on representing the trafficked person with dignity in communication materials calling for support to end human trafficking. In-depth interviews with professionals at organizations who advocate for an end to human trafficking will be synthesized into a qualitative study from which I will create a guide of best communicative practices to achieve non-exploitative storytelling. The guide will provide recommendations for nonprofits practicing advocacy work, ultimately strengthening efforts to bring justice to the estimated 20-30 million humans held captive in slavery today.

Persistence of Extractive Foraging in Humans and Wild Tufted Capuchins (*Sapajus libidinosus*) Abstract

Mackenzie Rose Pryor, CURO Research Assistant
Nam Money, Jessica C Respress
Dr. Dorothy Fragaszy, Psychology, Franklin College of Arts and Sciences

Wild tufted capuchin monkeys (*Sapajus libidinosus*) are the only New World primates that use stone tools for extractive foraging. Stone tool use is an extremely energy intensive practice for these monkeys, and their behavior has been described as persistent in nature. This study examined persistence of humans during an extractive foraging task and compared it to footage of wild capuchin monkeys practicing extractive foraging by cracking nuts with stone tools. Thirty human participants were provided a choice of ten tools to open a pomegranate, extract each seed, and deposit them individually into a receptacle. Foraging behavior frequency, variability, and task length for both humans and capuchins were coded and collated. Preliminary analysis suggests that capuchins will be more persistent than humans and it appears that capuchins tend to spend more time foraging, and use less diverse foraging techniques than humans. This implies that monkeys can maintain focused attention on an extraction problem for as long as humans. We discuss the hypothesis that working with a tool can promote the development of sustained attention.

Effects of Form and Level of Vitamin E Supplementation on Kinematic and Physiological Measures of Muscle Damage Following Intense Exercise in Horses

Lauren A Purvis
Dr. Kylee Duberstein, Animal and Dairy Science,

College of Agricultural and Environmental Sciences

Vitamin E is an essential dietary antioxidant thought to have a role in preventing delayed onset muscle soreness in exercising subjects. Previous research has shown that horses supplemented with natural α-tocopherol are able to achieve higher blood α-tocopherol levels as compared to those supplemented with the more commonly used synthetic acetate form. The purpose of this study is to determine if this confers any physiological advantage to the exercising horse. Eighteen horses will be placed on one of three diets for a seven week feeding trial: control diet fed 1000 IU α-tocopherol acetate; control diet plus 3000 IU supplemental α-tocopherol acetate; or control diet plus 3000 IU natural α-tocopherol. Horses underwent a 6 week exercise program of increasing intensity following one full week of supplementation. A standard exercise test (SET) was performed immediately before and immediately after the 6 week program. Blood was drawn pre- and 2 hours post-SET and analyzed for creatine kinase and aspartate aminotranserase (measures of muscle damage). Additionally, horses were filmed trotting (4 mps) in hand using high speed cameras. Filming was conducted immediately prior to each SET, and 24 hours post-SET to assess kinematic changes to the gait that may be induced by muscle soreness. Physiological measures of muscle damage were correlated to stride parameters such as swing and stance times as well as suspension of the gait. Findings from this study should show whether higher blood levels of α-tocopherol confer a physiological advantage to the performance horse.

Early Rehabilitation to Augment Skeletal Muscle Function Following Volumetric Muscle Loss Injury

Anita Qualls, CURO Research Assistant
Dr. Jarrod A Call, Kinesiology, College of Education

Significant loss of skeletal muscle tissue from severe trauma or surgical removal is known as a volumetric muscle loss (VML) injury. Muscle repair following VML injury is attenuated due to prolonged inflammation, increased fibrosis, and poor muscle regeneration, which results in extensive skeletal muscle function impairments and mitochondrial dysfunction. The purpose of this study was to implement early rehabilitation strategies that augment muscle function and mitochondrial capacity via range of motion, intermittent electrical stimulation, and supplementation with guanidionpropionic acid (GPA) (a drug to enhance mitochondria). Surgical VML injury was performed on the hind limb of male C57/B6 mice. Mice were randomized into three rehabilitation intervention groups: passive ankle range of motion (ROM), range of motion with intermittent electrical stimulation (ROM-E), and ROM-E with addition of 1% GPA mixed in standard chow (ROM-E-GPA). All groups performed two 30-minute rehabilitation therapy sessions per week beginning 72 hours post VML injury. Passive isometric torque, a measure of muscle stiffness, was recorded from each therapy session. Prior to sacrifice, peak isometric torque was assessed via an in vivo contractile test. Mitochondrial content and function were analyzed via citrate synthase activity and state three mitochondrial respiration rates from permeabilized muscle fibers, respectively. Following two months of rehabilitation, peak isometric torque was significantly greater in both ROM-E and ROM-E-GPA groups compared to ROM ($p=.0212$). Passive isometric torque decreased during individual therapy session in all groups (~15-40%). Preliminary muscle torque data indicates that early rehabilitation intervention techniques improve functional recovery and regeneration following VML injury.

Time is Brain: Expanding Access to Stroke Care in Rural Georgia Communities

Anita Qualls, CURO Research Assistant
Dr. Pamela Whitten, Communication Studies, Franklin College of Arts and Sciences

There is a lack of access to acute stroke care in rural Georgia, particularly with respect to the absence of neurological expertise and appropriate infrastructure, such as "stroke-ready facilities" to accurately identify and treat stroke victims. This issue stems from the extremely common and serious nature of stroke, the time-sensitive delivery for the treatment, and an underlying poor health condition correlated with a significantly higher incidence of stroke mortality in Georgia. Regional disparities in quality of healthcare services and

funding have been sustained through history and continue to create detrimental symptoms, including increased chance of death from stroke in rural areas and excessive spending to cover the expenses of stroke and disability throughout the nation. An analysis of root causes and symptoms was conducted to gain a better understanding of why these issues persist after multiple policies have been instituted to ameliorate these issues. To address these causes, three policy alternatives were developed: continued stroke education for physicians, community based stroke prevention coalitions, and state-wide implementation of telemedicine services. After analyzing the effectiveness, cost-benefit, and feasibility of each alternative against the status quo, it was determined that the best option for short-term implementation is continued stroke education for rural emergency physicians and the best long-term goal is state-wide implementation of telemedicine services.

Applications to Prolonging Data Collection Efficiency in Stream Channels

Matthew Quinn, CURO Research Assistant
Dr. John Dowd, Geology, Franklin College of Arts and Sciences

Within small first- and second-order streams, such as tributaries of the North Oconee River watershed, the response time to precipitation is fast. This response makes repetitive measurement of discharge and water chemistry necessary. Continual data collection in streams can be more efficiently measured with an automated system. The discharge of a stream is easily determined by a pressure transducer, but water chemistry proves to be more problematic. Probe calibration is prone to drift if continually left in the water. Three electrical conductivity systems are compared in this study. One system is a probe that remains in the stream taking measurements every five minutes. The second system is driven by peristaltic pumps that draw from the stream in order to fill a reservoir for measurement. The system measures conductivity every hour. The last system is a track that lowers a probe into the water on the hour and then raises it. The anticipated result is that the peristaltic pump apparatus will be the most efficient system due to more isolated measurement and greater protection from the stream. However, early failures have occurred when the air temperature drops below freezing or the intake is buried under shifting sands of the channel. The submerged probe has also failed from burial. When operating properly both systems have shown similar results, however the probe that stays submerged displays more drift in calibration over time. This research exhibits how reliable chemical data can be collected in remote areas where field visits are infrequent.

Investigations on the Distinct Isoforms of Duffy Antigen Receptor for Chemokines

Zehra Rahman
Dr. Melissa B Davis, Genetics, Franklin College of Arts and Sciences

The Duffy Antigen Receptor for Chemokines, also known as DARC, is a promiscuous chemokine receptor encoded by the DARC gene. This receptor protein is found, along with other cell types, on the surface of erythrocytes and helps to maintain chemokine homeostasis. DARC accomplishes this by sequestering chemokine activity, which indirectly helps to control the movement of immune cells to or away from the site of inflammation via a chemokine gradient. DARC has seven transmembrane domains with the extracellular binding region localized at the amino terminus. It is considered a promiscuous receptor because it can bind two structurally distinct classes of chemokines. The DARC gene also has two isoforms, A and B. These two isoforms are a result of two distinct promoters producing alternative transcripts. They are co-expressed in many tissues, but the functional differences between them have not been well-characterized. Using breast cancer cells that have been transiently overexpressed with both isoforms separately, our research seeks to investigate the functional roles of these isoforms. This will allow us to determine any distinct chemokine binding profiles between the two isoforms. We will accomplish this by using downstream applications such as co-immunoprecipitation and western blotting to validate overexpression and determine any protein-protein binding interactions. We will also perform ELISA assays to quantitate differences in chemokine concentrations in the media of the transfected cells. Our investigations will aid in the determination of any distinct chemokine binding between the isoforms, in

addition to better characterizing their role in a breast cancer context.

Branched-Chain Amino Acid (BCAA) Transporters: Mechanism, Physiological Function and Roles in Cancer

Simran Rajput, CURO Research Assistant
Dr. Takahiro Ito, Biochemistry and Molecular Biology, Franklin College of Arts and Sciences

Branched-Chain Amino Acids (BCAA) are amino acids with aliphatic side chains. Valine, leucine, and isoleucine are the three proteinogenic BCAA among the nine essential amino acids in humans. Besides their importance in nutrition, recent studies have shown the utilization of BCAA in cancer. Because cancer cells proliferate more rapidly than normal cells, they rely more on nutrients such as glucose and amino acids. In order to be used in cellular processes, BCAA need to be transported into cells. Therefore, the role of BCAA transporters is essential to understanding how they contribute to cancer growth. In this study, we used previous scientific literature and human gene expression databases to focus on the three BCAA transporter protein families expressed in various types of tumors, namely SLC6, SLC7, and SLC3 families, and discuss their mechanistic functions in cancer development. The gene expression of the solute carrier family 6 member (SLC6 family) transporters is upregulated in tumors of epithelial origin, such as cervical, pancreatic, breast, and colon cancer. BCAAs are highly enriched in lung tumor cell lines as a result of overexpression of SLC6A15. The SLC7 family members are highly expressed in nine different cancer types including endocrine lung carcinomas and pancreatic cancer. Our research guided us to look deeper into a SLC3 transporter (SLC3A2), because SLC3A2 is involved in guiding and targeting SLC7A5 and SLC7A8 in the plasma membrane. The identification of specific BCAA transporters that are essential for growth or survival of cancer cells may reveal a therapeutic target.

Healthcare for All: A Roadmap for a Healthier Georgia

Vineet S Raman, Ramsey Scholar, CURO Summer Fellow, CURO Research Assistant
Dr. Barbara Schuster, Clinical and Administrative Pharmacy, College of Pharmacy

The Patient Protection and Affordable Care Act (ACA) signed into law on March 23, 2010 is the most significant attempt to overhaul the American healthcare system since the creation of Medicare and Medicaid under the Great Society of President Lyndon B. Johnson. The ACA stopped short of reforming the multiple different systems of healthcare provision in the US. Instead, it focused on outlawing less consumer-friendly insurer practices and expanding insurance coverage by widening the definition of "low-income" to include childless adults under 138 percent of the Federal Poverty Level (FPL). The passage of the ACA was quickly followed by a June 2012 case in the Supreme Court that largely upheld the ACA, but struck down the stipulation requiring states to expand Medicaid to remain eligible for federal funds. Despite this overhaul, almost one in seven Georgians is uninsured, and over 300,000 Georgians have fallen into a coverage gap created due to the failure of Georgia to expand Medicaid. Rural and urban health facilities struggle to maintain their services and remain viable, causing their surrounding communities to suffer. Thirty-two states have expanded Medicaid, with seven of these expanding their Medicaid programs through non-traditional methods using Section 1115 waivers which allow for flexibility with federal funds. This policy paper asserts that the best option for Georgia is to expand Medicaid to 138 percent FPL, as originally mandated by the Patient Protection and Affordable Care Act (ACA).

Tablet-Based Data Collection for Leprosy Field Surveys

Vineet S Raman, Ramsey Scholar, CURO Summer Fellow, CURO Research Assistant
Dr. Corrie Brown, Pathology, College of Veterinary Medicine

Though previously rare, leprosy surveys have seen a recurrence as public health organizations seek to gauge the increase in leprosy prevalence in South Asia. All of these surveys are conducted mainly using paper-based methods. With the recurrence of leprosy surveys and the popularity of tablet-based data collection, this study seeks to implement a tablet-based form created using

Open Data Kit Software functioning on an Android operating system for a leprosy survey, and gauge the initial experiences of veteran paramedical field workers. The experiences of the field personnel were recorded through an interview and subsequently analyzed. The objectives of this study and paper therefore, are to assess the experiences of paramedical field workers with a novel survey tool, describe the tool, and evaluate its efficacy.

Incorporating Individual Consumer Physiology into Our Current Understanding of *Littoraria-Spartina* Interactions within Southeastern US Salt Marshes

Hend Rasheed, CURO Research Assistant
Dr. Craig W Osenberg, Ecology, Odum School of Ecology

Salt marshes are some of the most productive ecosystems on the planet. In the Southeastern US, this high productivity results from the seasonal turnover of a highly productive grass, *Spartina alterniflora*. A ubiquitous grazer in these marshes, the snail *Littoraria irrorata*, has been shown to exert varying degrees of top-down control on *Spartina* in marshes spanning Florida to New England. Variability in *Littoraria-Spartina* interactions can be linked with population biomass of *Littoraria*, which in turn is a function of population size structure and density. To date, however, no previous studies have disentangled the direct effect of *Littoraria* body size on feeding rates. Furthermore, the potential for the effect of body size on feeding rates to vary across a gradient in temperature has yet to be explored. To investigate the effects of temperature and *Littoraria* body size on feeding rates, we will conduct laboratory based feeding assays along a temperature gradient. We will then construct thermal response curves to better visualize this relationship and to directly parse out the effect of body size. We expect that temperature will be positively related to feeding rates up to a thermal optimum, after which feeding rates will decline. Furthermore, we anticipate that smaller individuals will respond more strongly to temperature changes than larger individuals owing to their metabolic demand. Knowledge of feeding rates across a range of temperatures will yield valuable insight into grazer physiology, their interactions with plant resources, and the potential for these interactions to shift with climate change.

Biophysical Characterization of Human Transketolase (TKT) and Transketolase-Like Protein (TKTL-1) Interactions with the Thiamine Diphosphate Cofactor

Aamanya Raval, CURO Research Assistant
Dr. Scott Pegan, Pharmaceutical and Biomedical Sciences, College of Pharmacy

Transketolase is a ubiquitous thiamine pyrophosphate (TPP) and Ca^{2+} dependent enzyme in both the glycolytic and pentose phosphate pathways (PPP). TKT catalyzes the reversible transfer of a ketose phosphate to an aldose phosphate, thus providing a reversible link between the PPP and glycolysis. A variant of TKT, known as TKTL-1 (Transketolase-like protein 1), is highly expressed in malignant tumors indicating its potential role in the phosphoketolase pathway analogous to TKT. However, the exact physiological role of TKTL-1 is yet to be identified. If TKTL-1 requires TPP as a cofactor for its catalysis, then it will be involved in pathways similar to TKT. The expression and purification of TKT and TKTL-1 from *E. coli* extracts as His6-tagged proteins. This process uses protein isolation procedures, nickel affinity chromatography, and isothermal titration calorimetry (ITC). ITC displays the initial binding titrations of thiamine and interactions with its phosphate linked analogues. Exothermic values should indicate that there are two possible binding sites within the enzyme and a high KD shows a weak binding affinity of TKT for the TPP cofactor. The information provides us with greater understanding about the physiological role of TKT-L and designing inhibitors for the enzyme which can later be used for anticancer drug development.

Variant Identification Using RNA-Seq Data for Improvement of CRISPR gRNA Design in Hybrid *Populus*

Jacob Reeves, CURO Research Assistant
Dr. C. J. Tsai, Genetics, Franklin College of Arts and Sciences

CRISPR is a powerful tool for genome editing; however, designing CRISPR guide RNAs (gRNAs) is more challenging for outcrossing species such as *Populus* because of sequence heterozygosity. Though many programs have been borne in hopes of facilitating gRNA design for CRISPR experiments across a variety of genome-sequenced organisms, none of them have yet considered SNPs. Our research aims to incorporate sequence variants into existing gRNA design programs, thereby improving the gRNA specificity and CRISPR editing success rates. Our lab has previously developed a web-based tool that allows users to query the *Populus tremula* × *alba* 717-1B4 (Pta717) genome for SNPs and indels in custom gRNA sequences based on genome re-sequencing data. However, some genomic regions have less than 5 times the coverage due to shallow sequencing. To address this issue, we exploited deep genome sequencing data of Pta717 from the Department of Energy's Joint Genome Institute to obtain high-confidence SNP and/or indel calls with an average of 576 reads per nucleotide. The completion of this version is expected to improve CRISPR editing reliability for *Populus* researchers engaged in genome editing experiments.

African Agency in Policy and Project Autonomy: An Analysis of Investment Promotion Centres in Rwanda, Botswana, and Lesotho

Rara Reines, CURO Honors Scholar, CURO Research Assistant
Dr. David O Okech, Social Work, School of Social Work

African agency is a relatively new concept in the field of International Relations. This idea insists on viewing African states and actors as serious, real subjects in their own right rather than as non-participants in International Relations or as passive actors. The dominant focus of the African agency literature has been on relations between states and the collective impact of African groupings of states in international fora. Thus, the current literature on African agency is limited in two major ways: the literature is state-centric in a world where non-state groups and organizations exert increasing influence; and the literature has neglected the role of the private sector as a major driver of development processes on the continent. This research posits Branding Agency as the term for understanding agency in the context of the private sector, which can be analyzed through the activities of Investment Promotion Centres. Branding Agency concerns how domestic and international actors, be they individuals, institutions, or private sector firms, are actively pursued to invest in and contribute to a nation's prospective and ongoing development projects. The research methodology includes a literature review of African agency, comparative analysis of major development projects' leadership, funding, and ownership, and case studies of development projects exerting strong agency. This research aims to develop a framework for a holistic conceptualization of agency, including Branding Agency, and impact how the reality of development is viewed in Africa regarding the relationship between African governments and the private sector.

Lassa Virus GP1 Glycoprotein Receptor Binding Site Characterization

Hayley Reynolds, CURO Research Assistant
Dr. Melinda Brindley, Infectious Diseases, College of Veterinary Medicine

Lassa virus (LASV) is an Old World arenavirus endemic to West Africa. It is responsible for severe cases of hemorrhagic fever and is the cause of 5,000 deaths per year. No effective human vaccine currently exists and the only treatment available is ribavirin, which is costly, must be administered early after infection to be effective, and has many side effects. LASV infection is initiated by the viral glycoprotein complex (GPC), which binds to the cellular receptor, facilitating viral entry and fusion with the target cell. Our project's goal was to define the receptor binding site(s) in the LASV GPC. Structurally defining the receptor binding site will provide targets for new entry inhibitors and vaccines. Site-directed mutagenesis was implemented on charged, hydrophobic, and glycosylation site residues in order to functionally characterize domains in the GP1 subunit of LASV GPC. Constructs were first evaluated for cleavage efficiency and fusion activity, and then for transduction efficiency. In general, there was observed high correlation between cleavage efficiency and cell-to-cell fusion activity, demonstrating that properly processed GPC was able to mediate cell-to-cell fusion. Due

to the BSL4 classification of LASV, vesicular stomatitis virus (VSV) pseudotyped particles were utilized to display LASV GPC's and mimic viral entry in HAP1, HAP1-ΔDAG1, and Vero cells. By using cell types with differential production of cellular receptors, we compared transduction efficiencies and were able to identify several residues that potentially play a role in alpha dystroglycan (a-DG) and lysosomal associated membrane protein 1 (LAMP1) interactions.

Assessment of Spatial Distributions of Sea Turtle Nests In Relation to Artificial Lighting in St. Kitts, West Indies

Jessica Lauren Reynolds
Dr. John Maerz, Forestry, Warnell School of Forestry and Natural Resources

Light pollution associated with coastal development is a widely recognized threat to sea turtle populations. In addition to causing disorientation in hatchlings, artificial lighting poses a threat to sea turtles because it can deter females from nesting in suitable areas and increases nesting in less-suitable but unlit habitats. St. Kitts in the northeastern Caribbean Sea is an important nesting area for the endangered green (*Chelonia mydas*) and critically endangered hawksbill (*Eretmochelys imbricata*) sea turtles and St. Kitts has had a significant rise in tourism-related development. Our goals are to determine whether: light pollution levels on St. Kitts beaches are positively correlated with the probability of a false crawl and are negatively correlated with sea turtle nest density; there is a threshold level of artificial light pollution above which no sea turtle nesting is observed; and there are longer-term spatial trends indicating effects of coastal development on the number of sea turtle nests. In 2016, we used GIS data to quantify development along coastal beaches and we measured light pollution using a Unihedron Sky Quality Meter. We are modeling beach light levels as a function of development and correlating those measurements with nest survey data from the St. Kitts Sea Turtle Monitoring Network (SKSTMN) for hawksbill and green adult female emergence events collected from 2010 to present. Our ultimate goal is to inform management decisions, minimizing coastal light pollution and development impacts on sea turtle nesting.

Neuroanatomical Correlates of Functional Decline during Normal Aging

Joshua Reynolds, CURO Research Assistant
Dr. Steve Miller, Psychology, Franklin College of Arts and Sciences

Previous research has shown that age-related neural atrophy and cognitive decline predicts declines in functional independence (FI), or the ability to perform daily activities. The current study aimed to test whether volumetric brain differences predict FI in a sample of community-dwelling older adults, whose data was drawn from two neuroimaging studies of brain changes in aging (N=109, mean age=73.4 years, 63% female, 98% Caucasian). We additionally aimed to determine whether cognition mediates the relationship between brain volume and FI. Cognition was measured using the Repeatable Battery for Assessment of Neuropsychological Status (RBANS; Study 1, N = 48) and the CNS Vital Signs (Study 2, N = 61). FI was measured using the Direct Assessment of Functional Status (DAFS). Analyses were conducted for total gray matter volume (GM) and five regions of interest: dorsal-lateral prefrontal cortex (PFC-DL), orbitofrontal cortex (PFC-OF), primary motor cortex (MC), and dorsal (DS) and ventral (VS) visual processing streams. All brain volumes were corrected for intracranial volume (ICV). Initial regression analyses using the combined sample confirmed that GM (r^2=0.175, p=0.000), PFC-DL (r^2=0.085, p=0.002), MC (r^2=0.092, p=0.001), and VS (r^2=0.135, p=0.000) volumes predict FI. Mediation was tested separately in the two samples using bootstrapping analysis. Results showed that cognition partially mediated the relationship between GM, PFC-DL, MC, and VS and FI. These findings provide support for the hypothesized model of brain structural, cognitive, and functional decline in aging and suggest that improving cognition in older adulthood may mitigate the negative effects of brain atrophy on FI.

Rare Earth Elements Distributions in the Critical Zone: Possible Roles of Pine Versus Hardwood Vegetative Covers

David Forest Richards IV
Dr. Paul A Schroeder, Geology, Franklin College of Arts and Sciences

Rare Earth Elements (REE) are metals used in technology that enable global economic growth. Though these elements are titled as rare, they are only rare in abundance. Soil-forming processes can concentrate REE. This study hypothesizes that modern surface biogeochemical weathering in the Critical Zone redistributes the concentrations of REE. Furthermore, vegetative cover controls relative pH, redox, and hydrologic flux conditions, which can affect REE mobility. The study site is in Calhoun, South Carolina on a degraded landscape due to farming. The samples were collected from 0 to 350 cm depth at proximal sites, including a hardwood forest and a site extensively farmed until the 1950s cultivated as pine forest. All REE's were measured by Induction Coupled Plasma Mass Spectrometry (ICPMS), enriched relative to normalized chondrite values. Both sites are mostly concentrated in REE. The B-horizon is enriched in Ce relative to La for both pine and hardwood; however, Ce is enriched at depth in the hardwood. The mobility of Ce^{3+} under reduced conditions versus Ce^{4+} under oxidized conditions could occur by lessivage, soil organic matter complexation, leaching percolating water, and adsorption by iron-, aluminum-oxides and clay minerals. Ce enrichment correlates with goethite in the profile, suggesting that pine vegetative cover and active agricultural land management may differently mobilize REE. If compared to erosional histories and conditions of vegetation cover, REE may be a record of land use history. The REE patterns developed in saprolite offer great potential in understanding environments responsible for saprolite formation rates and insight to sustainability of land resources.

Digital Timeline of Mina Loy's New York Years 1937-1953

Jesse Riley, CURO Research Assistant
Dr. Susan Rosenbaum, English, Franklin College of Arts and Sciences

I am creating a digital timeline of poet and visual artist Mina Loy's life and work in New York during the years 1937-1953. This timeline is a part of a larger digital platform project *Mina Loy: Navigating the Avant-Garde*, which is in the process of being approved for an NEH Digital Humanities Advancement Grant. The timeline will be placed on the platform's website (mina-loy.com) with a goal of creating multimodal access to Mina Loy's life and work. The timeline was created digitally using a variety of sources, including Loy's biography and archives. The project hopes to develop a theory of *en dehors garde* that accounts for the contributions of women and people of color to the historical avant garde. We expect to find that en dehors garde is not a supplement for or plea for inclusion in the *avant-garde*, but rather a marginalized movement of women and people of color creating their own artistic spaces to drive change '*en dehors*,' or 'coming from the outside.' Through the timeline of her New York years, we ask how Mina Loy's life and poetry in New York contributed to or provided for *en dehors garde*? Much of Loy's work is presently buried in archives, and we hope through the timeline and larger digital platform to create accessibility to her life and work.

The Role of Histone Modification in Splicing and the Tethering of ps-mRNA

Lexi Blue Ritter, CURO Research Assistant
Dr. Xiaoyu Zhang, Plant Biology, Franklin College of Arts and Sciences

There is a dearth of knowledge surrounding the mechanisms by which post-splicing RNA (ps-RNA)—which is completely transcribed but incompletely spliced—becomes fully spliced. Additionally, there is growing interest in the study of histone covalent modifications and their interactions with chromatin and other proteins. Different histone modifications, as well as the degree of modification, may change the activity of gene expression. The *Arabidopsis* double-mutant *sdg7 sdg8* eliminates the trimethylation of lysine 36 on histone 3 (H3K36me3), which plays a key role in regulating gene expression. Elimination of trimethylated H3K36 causes severe developmental phenotypes; furthermore, H3K36me3 plays a role in the splicing of RNA. While typically thought of as a co-transcriptional process, splicing may occur post-transcriptionally, creating partially-spliced RNA (ps-RNA); the post-transcriptional model of splicing is hypothesized to be related to the interaction between HUA2, H3K36me3, and ps-RNA. Double and triple mutants for the genes HUA2, HULK2, and HULK3 (HUA2-like genes) were identified and genotyped. Many of the plants sowed were fully or partially unable to grow, indicating the important role that these genes play

in development. Four of the plants grown were identified as triple mutants, lacking all three of the genes. Further experimentation will be performed to determine the enrichment of these genes for certain histones and the modifications of those histones, as well as the levels different RNA fragments (ps-RNA and m-RNA) in the chromatin and nuclear environments. The model of post-transcriptional splicing will give insight into the machinations of DNA formatting and gene expression.

Laboratory Operations Support for Small Satellite Research Laboratory

James Hugh Roach, CURO Research Assistant
Paul Hwang
Dr. Marguerite Madden, Geography, Franklin College of Arts and Sciences

As members of the laboratory operations team for the Small Satellite Research Laboratory (SSRL), we provide a wide array of support services and provide necessary infrastructure to ensure mission success. One such vital service is the community outreach and graphics resources provided by our team lead Paul Hwang. Through a process of intensive design, Paul ensures that things like our mission patches and website meet the high levels of aesthetic quality necessary to attract the highest levels of student ability here at the University of Georgia. We also handle the organization of internal lab structure, to include onboarding, leadership hierarchy, internal clearance levels, and more, all of which are vital to smooth operation of the lab. On the technical side, our backend developer, James Roach, ensures all software infrastructure needed by our team is both available and at an acceptable level of stability so our labmates can proceed with their workflows in the most efficient way possible. This software architecture includes, but is not limited to: computational servers, our public website, version control systems, and the digital security of our lab. Our team mission is to provide whatever is needed for the success of our colleagues and the overall SSRL mission objectives.

Propagation of Errors in Single Cell Oscillatory Time Series to the Periodogram

Sarah Robinson, CURO Research Assistant
Dr. Jonathan Arnold, Genetics, Franklin College of Arts and Sciences

The biological clock in an organism controls the timing of biological processes from development to behavior. Single cell measurements are taken to determine if genes that are synchronized have the same oscillation frequency in different cells. These gene expression measurements are typically noisy due to two sources of error: the stochastic noise from the cell itself and the detector noise for cell fluorescence. A model has been proposed to propagate the errors of the single cell gene expression measurements to the periodogram and phase distribution. To verify the method, three different sinusoid models were simulated, in which the amplitude, period, or phase was randomized individually. Randomly generated data was used in the simulations of the original experiment, as well as a reconstructed model which mimics an experiment without noise in the measurements. Comparison of the reconstructed model to the propagation model showed that the propagation model estimates the true proportions of variance in the gene expression measurements accurately. This is useful for all gene expression measurements in single cells that possess an oscillatory behavior.

Analysis of Different Methods for Quantitative Western Blot Analysis in the Avian Model System

Logan Ruiz, CURO Research Assistant
Dr. Andrew Benson, Poultry Sciences, College of Agricultural and Environmental Sciences

Western blotting is a commonly used laboratory practice that can be used to quantify protein levels in samples. One essential consideration for quantitative Western analysis is the amount of protein in each lane, which may vary due to inaccuracies with protein concentration determination, loading volume, or differences in transfer efficiency. To account for these potential differences, the amount of target protein is normalized to the amount of protein present in each lane by using a loading control. A good loading control is one that is co-expressed with target protein within the same sample and consistently expressed between samples. Tubulin, beta-actin and GAPDH have

traditionally served as loading controls. Unfortunately, very little research in the avian model has employed quantitative Western analysis, thus little is known about good loading controls for use in the chicken. Bio-Rad has recently developed Stain-free technology, a new method that allows for total protein quantification and normalization using haloalkylated tryptophan fluorescence. We recently compared this stain-free technology to the standard practice of using loading controls, chicken anti-beta-actin and GAPDH, for quantitative Western analysis in the avian model system. Our results show that the stain-free technology was superior for quantitative comparison of protein expression between different chicken tissues (liver, heart, muscle, kidney, spleen, lung) and within the same tissue.

Books for Keeps' "Stop Summer Slide!" Program and its Impact on Literacy Levels in Clarke County Schools

Miranda Russell
Dr. David B Mustard, Economics, Terry College of Business

I aim to answer the question "Does Books for Keeps' 'Stop Summer Slide!' program increase literacy levels for elementary students in the Clarke County School District (CCSD)?" Books for Keeps is a 501(c)3 non-profit founded in Athens, GA that works to improve childrens' reading achievement. Books for Keeps' signature program "Stop Summer Slide!" provides each child with 12 new books of their choosing at the end of the school year. The Clarke County School District supports the "Stop Summer Slide!" program and believes that it has had positive effect on their students' reading levels since the program began 7 years ago in 2009. This research is significant because an empirical analysis will allow Books for Keeps and the CCSD to determine where the program is succeeding and where changes could be made to better support the students. I will answer my question by comparing the students' spring and fall SRI Lexile levels, a metric that determines the reading level of a student. My thesis is that schools without Books for Keeps' intervention program will demonstrate the expected "summer slide"—that is, that students will "slide back" and decrease their reading levels during the summer. I believe that students that do participate in the intervention program, however, will demonstrate either a constant reading level or even a slight increase. Using econometric tools, I will also control for the variables of gender, socioeconomic status, race, special education status, gifted status, English fluency, number of yearly behavior referrals, and number of yearly absences.

An African American Oral History: Historic and Contemporary Experiences of Gentrification in the Hancock Corridor

Adam Salway, CURO Research Assistant
Dr. Jerry Shannon, Geography, Franklin College of Arts and Sciences

This research considers the risk of displacement due to gentrification experienced by residents of the Hancock Corridor, a historic African-American neighborhood in Athens, Georgia. In this project, we are working alongside neighborhood residents, UGA archival librarians and a team of community researchers to synthesize archival, interview, and geospatial data in order to create a robust digital story mapping platform that reflects the historical and cultural importance of the Hancock Corridor. We seek to create this online digital experience in a way that documents the important voices of the Hancock Corridor residents, while showing their contemporary experiences with displacement pressure in the face of ongoing development that threatens the identity of their community. This participatory approach enables community-based researchers to conduct oral history-style interviews with residents directly affected by urban development. Upon synthesizing these data, narratives of contemporary displacement based upon continued disinvestment in the Hancock Corridor are elucidated. We argue that there is a considerable disparity between the local knowledge of African-American history in the Hancock Corridor and the diligence with which it is and has been documented. Further, contemporary knowledge about resident experiences of displacement pressure are lacking from important discussions on future development decisions by city officials. By collecting available sources of data pertinent to this history and present, this project will reveal both the cultural and historical value of the Hancock Corridor and its current vulnerability to on-going and unchecked urban development.

All-Source Fusion in Combatting The Global Terrorist Threat

Peyton Sammons
Dr. Loch Johnson, International Affairs, School of Public and International Affairs

The technology of the 21st century has created a set of unique challenges for the intelligence community, in that it is easier than ever before for terrorists and other transnational criminals to coordinate on a global scale. The purpose of this research is to examine the role of all-source fusion as a tool by which intelligence communities in the US, the UK, Canada, and Australia counter terrorist threats within their borders, and how each respective intelligence community uses all-source fusion to protect the civil liberties of their populations. By examining quantitative and qualitative data to identify the elements of all-source fusion that have been successful in countering terrorism, I have conducted a comprehensive literature review on all-source fusion with a specific focus on the four aforementioned case studies. Through my research, I have found that all-source fusion is by far the most effective intelligence collection method that allows intelligence officers to provide policymakers with the most comprehensive picture of the "who, what, when, where, and how" of each issue area. By combining all of the INT's means that the weaker links, such as HUMINT, in the collection process are accounted for and counteracted.

Legislative Complexity in an Increasingly Competitive Electoral Environment

Adrien Sandercock, CURO Research Assistant
Dr. Anthony Madonna, Political Science, School of Public and International Affairs

I hypothesize that as electoral competitiveness has increased over time, legislation has gotten more complex due to both the majority parties' use of procedural methods to control the legislative process, increased minority party leverage, and an overall desire to make opaque an increasingly transparent legislative process. This is criticized as being potentially harmful, but there is little documentation of this phenomenon. I will model the relationship between electoral competitiveness and legislative complexity by building on data already collected as part of the University of Georgia Amending Process Project. Specifically, I will take data on landmark bills and add additional variables related to their consideration and passage. Electoral competitiveness will be measured as the average margin of victory in House and Senate races in a particular year; legislative complexity will be defined by a multi-variate measure that includes factors such as bill length, number of companion bills, whether or not a bill is an omnibus, how frequently a bill references other bills, and how much time was spent discussing the bill.
I anticipate that as elections have grown more competitive, legislation has grown more complex. In cycles with higher competition (lower average margin of victory), there will be more complex legislation, while less competitive electoral cycles will have less complex legislation. This research is significant because there is not a comprehensive measure of how complex legislation is; creating one will contribute to research in this field substantially. This relationship could provide new insight into the legislative process and its motives.

Utilizing Cultural Advisors in Marriage and Family Therapy Practice

Emily Sands, CURO Research Assistant
Dr. Desiree M Seponski, Child and Family Development, College of Family and Consumer Sciences

Mental health practitioners assist ethnically and linguistically diverse clients, a portion of which are refugees who have experienced trauma, as they have a heightened risk of mental illness compared to the overall population (Fazel, Wheeler, & Danesh, 2005; Porter & Haslam, 2005). Despite the increase in client diversity, research is lacking on cross-cultural psychotherapy and in particular with marriage and family therapy and trauma treatment of refugee populations. The purpose of this study is to explore cross-cultural clinical practices by North American marriage and family therapists and advocate for the use of cultural brokers. This study is driven by the following research question: How can North American marriage and family therapists' use of cultural brokers enhance refugees' therapy experiences. In this qualitative study, data were collected through open-ended interviews to gain detailed and thick transcriptions of the data. Thematic analysis was

utilized to identify emerging themes. This study's preliminary findings support the use of cultural brokers in culturally responsive therapy.

United States Corporate Tax Reform: Keeping Capital within US Borders

Nancy Saucedo, CURO Research Assistant
Dr. Chris Pope, Banking and Finance, Terry College of Business

Since the 1980s, the United States has seen an increase in the number of corporate tax inversions. A corporate tax inversion is a strategy that companies employ to reduce their tax payments. This typically occurs when a domestic company changes its domicile to a country with lower taxes while maintaining the same level of operations in its country of origin. This practice has brought about much debate regarding what should be done to reform current corporate tax law. With one of the highest foreign corporate income taxes in the world at 35%, the US has struggled to keep corporations on American soil. Many US companies manage to keep trillions overseas using inversions and tax loopholes. Despite Congress and the US Treasury implementing laws to stifle tax evasion, the US still fails to compete with tax havens around the world. We will begin by taking a closer look at the intricate history of International tax law, analyze the worldwide system implemented by the US, and examine the shortcomings of using this tax system instead of a territorial tax system. From there, we will evaluate proposed solutions from the Trump Administration, GOP, and various tax experts, evaluating the advantages and disadvantages of each proposal. Finally, our quantitative case study will analyze a US company's failed attempt at inverting. We will evaluate and compare the company's taxes under various tax reform proposals to determine which would have the most positive effect on taxes.

Nanoparticles Transport of FDA-Approved Drugs Across the Blood Brain Barrier in a Porcine Stroke Model

Kelly Marie Scheulin, CURO Research Assistant
Dr. Franklin Delano West, Animal and Dairy Science, College of Agricultural and Environmental Sciences

Stroke is the leading cause of disability and the fourth leading cause of death amongst adults in the United States. Despite the devastating effects of stroke, there is only one FDA-approved treatment, which in itself is only advantageous in a small fraction of strokes. Our research team has developed two enabling technologies 1) a highly lipophilic, biodegradable nanoparticle (NP) delivery platform that has a high zeta potential and the novel ability to cross the blood brain barrier (BBB) and 2) a novel translational pig stroke model. We hypothesize that this novel NP technology will be able to deliver FDA-approved, hydrophilic drugs past the BBB into the damaged brain tissue in our pig model, which will help reduce the cytotoxic environment for future stem cell transplant therapy. In preliminary studies, we have determined the FDA-approved drugs, Co-Q-10 and Tetracycline, can be successfully incorporated into our novel NP vehicle (at concentrations of 304.92 ug/mL and 186.24 ug/mL, respectively). To trace NPs delivered into the injured brain tissue, we successfully incorporated the fluorescent Cyanine 5.5 dye into NPs. We have demonstrated that intravenous injection of NPs leads to high Cyanine 5.5 fluorescence concentrations in the brain, heart, lungs, kidneys, liver and spleen in a piglet neural injury model. These results suggest that NPs can cross the BBB and transport FDA-approved drugs to the injured site of our novel pig model. This study will provide a novel approach to stroke treatment and will likely lead to more success in human clinical trials.

Investigation of Visual Event Related Potentials in Schizophrenia, Schizoaffective, Psychotic and Non-Psychotic Bipolar Disorders

Zoe Schneider, Ramsey Scholar
Dr. Brett Clementz, Psychology, Franklin College of Arts and Sciences

Event related potentials (ERPs) are electrophysical responses to stimuli that can be measured non-invasively in electroencephalographic (EEG) studies. Previous studies have used ERPs to evaluate early processing deficits present in individuals with schizophrenia. The goal of this research is to compare early visual processing over time across five diagnosis groups (Healthy

Control: HC, Schizophrenia: SZ, Schizoaffective disorder: SAD, Bipolar disorder with psychosis: BD-WP, and Bipolar without psychosis: BD-NP) using four different visual tasks. 407 individuals (HC = 153, SZ = 64, SZAFF = 79, BD-WP = 65, BD-NP = 46) completed each task at five BSNIP2 sites while 64 sensor EEG data was recorded. A black square was placed in the subject's central, left, right, or bilateral visual field. Grand average ERPs identified peak sensors across all groups. One-way ANOVAS were run on each 10ms time bins for each visual task to identify group differences. We hypothesized that all three psychosis groups would show a reduced response to the visual stimuli in the first 500 ms, and the BP-NP and HC groups would display similar responses. These tasks will allow us to test central visual processing, interhemispheric visual processing, and contralateral visual processing in all diagnosis groups. These results give insight into the dysfunction of common neural paths and the pathophysiology of psychotic groups. They may also provide greater understanding of the causes and mechanisms of early visual deficits in individuals with psychosis.

Intersectional Failure: The Effect of Zero-Tolerance Policy on Girls of Color

Chloe Schrader
Dr. Nichole Ray, Communication Studies, Franklin College of Arts and Sciences

This exploratory research investigates how the lack of intersectional theory in education practices prevents students, especially girls of color, from getting an equal education and therefore the validation and empowerment education can provide. This research is important because intersectional failure starts in elementary school and creates a cyclical pattern of poverty; it has long lasting effects on students' educational outcomes. I will be analyzing the ways in which zero-tolerance policy affects girls of color and contributes to the school to prison pipeline in order to examine the structures of domination that cause this intersectional failure. I will then use this analysis to inform further research in the Athens-Clarke County school district and ultimately create policy to institutionalize solutions and better practices. This is crucial to breaking the cycle of poverty and incarceration of women of color and providing an equal education to all students.

Filipino Immigrant Social Networks and Their Influence on Settlement Experience

Anna Schramski, CURO Research Assistant
Dr. Denise Clark Lewis, Child and Family Development, College of Family and Consumer Sciences

Findings from a qualitative study with 14 mid-life Filipino immigrants residing in the United States revealed that work settings, existing familial structures in the US, religious settings (largely Catholic due to the influence of home country), and the Filipino immigrant community allowed for the formation of new social networks. Individual and dyadic interviews were conducted and analyzed using Berry's theory of acculturation, which defines four acculturative strategies by the relationships between host culture and immigrant group; and the maintenance of home culture by the immigrant group in the new environment. These strategies are integration, assimilation, separation, and marginalization. We sought to determine where Filipino immigrants find their social networks, the influence of social networks on adjustment and well-being during settlement, and how those influences led immigrants to adopt one of Berry's strategies of acculturation. Some individuals sought interactions similar to those found in the Philippines and preferred to surround themselves with the familiarity of Filipino cultural practices. This reflects the strategy defined as separation. Others expressed the desire to establish a new community, actively seeking the strategy of assimilation into the host environment. Fascinated with the fast-paced, work-oriented culture of the US, these individuals often found social networks through their occupations. Many participants stressed the importance of engagement while adjusting to a new environment; those who did not have an active social network expressed feelings of depression and loneliness, which Berry describes as marginalization. This research adds to the existing literature on the settlement of mid-life Filipino immigrants in the US. Additionally, it could be used modify existing and create new culturally responsive programs serving Filipino

immigrants by providing contextualization of the acculturative process.

Understanding Toxicity of *Botrytis cinerea* Mutant

Patrick Thomas Seethaler, CURO Research Assistant
Dr. Maor Bar-Peled, Biochemistry and Molecular Biology, Franklin College of Arts and Sciences

Botrytis cinerea is a devastating pathogenic fungi that affects the yield of over 100 crops. It causes a gray mold and rot disease that drastically damages important agricultural crops. Previous work in the lab found that a mutation in the nucleotide-sugar metabolism leading to UDP-rhamnose gave rise to fungi that are unable to effectively infect plants. This research also helped to identify the potential toxic intermediate UDP-KDG. The exact mechanism for toxicity remains elusive. To identify the toxicity, we mutate the enzyme involved in the conversion of UDP-galacto-pyranose to UDP-galacto-furanose (UDP-galactomutase) so as to mimic and intensify the toxicity pathway. In doing so, we can compare the initial substrates to the end products to determine the pathways of metabolism. Through the use of alditol acetate and analysis through LC/MS and GC/MS, we hope to see differences in the final concentrations of water-soluble metabolites inside the cells and the glycans in the cell wall when the wildtype and knockout gene strains are compared. This will show us the specific pathway that the toxicity occurs through.

Saharan Dust Increases Amount of Vibrio Pathogens in the Florida Keys

Roland Francis Seim, CURO Research Assistant
Dr. Erin K Lipp, Environmental Health Science, College of Public Health

Vibrio is a genus of bacteria found in marine habitats world-wide but usually represents a minor portion of the microbial community. Previous studies show that *Vibrio* populations can grow explosively in response to annual Saharan Dust events. While *Vibrio* has been shown to increase in response to dust-associated nutrients, e.g. iron, species-specific characterization is not known. This information is important to determine if dust deposition leads to an increase in pathogenic species. Here, using species specific PCR we examined the presence of *Vibrio* pathogens among isolates cultured at Looe Key Reef in the Florida Keys, US before, during, and after a Saharan dust event. Specifically, we determined if dust was associated with the presence of human pathogens such as *V. alginolyticus*, *V. cholerae*, and the coral pathogen *V. coralliilyticus*. *V. cholerae* is known to cause cholera; *V. alginolyticus* can cause wound and ear infections. Data collected to date indicated that the abundance of pathogenic *Vibrio* species increased in response to these dust events. We collected approximately 300 isolates over a four-day period during a Saharan Dust event during the summer of 2016 and extracted DNA for PCR and gel electrophoresis to identify the *Vibrio* species present. This research has broader implications in public health, environmental health, and microbiology. It is important to understand the *Vibrio* response to these dust events and the impact it might have on the health of residents living in the Florida Keys.

Characterizing the Species Distributions of North American *Pyractomena* Fireflies

Pearl Shah, CURO Research Assistant
Dr. Kathrin F Stanger-Hall, Plant Biology, Franklin College of Arts and Sciences

Different *Pyractomena* species differ greatly in the biogeographic distribution across the United States. Extensive research has been done on the distribution patterns of birds, mammals, and plants and the relationship, but what determines the spatial distribution of *Pyractomena* fireflies is currently unknown. We investigated the impacts of environmental variables, including average precipitation, average temperature, elevation, and soil characteristics on the distribution of the 16 species of North American *Pyractomena* fireflies, using field records from the past 50 years, national data bases and ArcGIS mapping software. Soil was tested because the vast majority of a firefly's life is spent during the larval stage, where these insects largely prey upon gastropod mollusks and other semiaquatic invertebrates. Understanding the biogeographical patterns of species distributions will ultimately contribute to habitat and species conservation.

Using Electrical Stimulation to Lower Post-Prandial Blood Sugar in People with SCI

Nivita Sharma, CURO Honors Scholar, CURO Research Assistant, CURO Summer Fellow
Rachel Aldridge
Dr. Kevin McCully, Kinesiology, College of Education

Type II Diabetes is prevalent among individuals with spinal cord injuries (SCI) because of their limited mobility. Exercise has been shown to lower post-prandial blood glucose levels in able-bodied people. Electrical stimulation of the muscles causes similar muscle contractions that occur when an individual exercises. Muscle contractions act like insulin to allow cells to consume glucose from the blood. We aim to observe changes in blood glucose levels when six muscle groups (quadriceps, hamstrings, and calves of both legs) are electrically stimulated after the consumption of a carbohydrate rich meal in able-bodied and individuals with SCI. We hypothesize that electrical stimulation will cause a clinically relevant decrease in post-prandial blood glucose levels. Continuous glucose monitors (CGM) will be used to measure the blood glucose levels throughout the three-day experiment. Electrical stimulation will be performed using a medical grade electrical stimulator (Theratouch 4.7, Rich-Mar). The first day will include insertion of the CGM, the second day will involve sedentary conditions after the consumption of a carbohydrate-rich meal, and the third day will involve 60 minutes of electrical stimulation after the consumption of a carbohydrate-rich meal. All meals provided to the participants will be established using their estimated caloric intake and physical activity. CGM data on the sedentary day will be compared to the electrical stimulation day to test for effects of stimulation. Significance: If effective, post-prandial electrical stimulation can be a simple method to decrease the risk of Type II Diabetes in individuals with SCI.

Unalterable Roots

Sachi Shastri, CURO Honors Scholar, CURO Research Assistant
Dr. Christopher R Lawton, History, Franklin College of Arts and Sciences

The history of Putnam County, Georgia, has long been told through a biased, whitewashed perspective that completely neglected the relevance of African Americans in Putnam's development. Historical markers posted at antebellum mansions celebrate the achievements of white planters, while ignoring that their houses, their lives, and the county of Putnam, itself, was built upon the labor of slaves. Ignorance of black contributions is a common characteristic of small Southern towns, but Putnam is unique in that both Alice Walker, author of *The Color Purple*, and Joel Chandler Harris, teller of the *Uncle Remus* tales, grew up in the same Putnam neighborhood nearly a century apart. More remarkable is that both internationally famous authors, in their own way, chronicled the lives of Putnam's African American communities that historical markers still miss. The project has been to begin developing a book proposal for UGA Press that will expand the history of Putnam with an eye towards making visible the intersectionality and inclusivity recognized by both Harris and Walker. The work began with a literature review on the relevance of geographical locations to history, and will soon progress to setting up community events that will allow local people to tell their personal stories. By understanding the history of Putnam as told by a diverse group of people, and using those histories to create context for narrative elements from both Harris and Walker, the book proposal will create a space for telling Putnam's more authentic, more inclusive, more complicated history.

Infant Sleep Duration among White Breastfed and Black Formula Fed Infants at 16 Weeks

Olivia Shealy
Dr. Leann Birch, Foods and Nutrition, College of Family and Consumer Sciences

The National Sleep Foundation recommends daily sleep duration of 12-15 hours for infants (4-11 mo) as appropriate for health and well-being. Insufficient sleep and poor sleep quality have been linked to adverse effects on development and behavior, as well as increased risk of obesity. Both race and feeding mode have been examined as possible factors affecting infant sleep patterns, with variable results. Further research is needed to clarify these associations. This study examines the differences in infant nighttime sleep duration, and

total sleep over a 24-hour period at 16 weeks among a sample of black formula fed (BFF) and white breastfed (WBF) infants. Black and white mothers (n=44) participating in the Maternal and Infant Growth Study reported infant sleep duration (hrs) via self-completed questionnaire at a 16-week postpartum study visit. Infant feeding mode (>80% of intake), breastfed (n=23) or formula fed (n=21), was determined using mother-provided bi-monthly feeding logs. WBF infants slept longer than BFF infants over a 24-hour period (p=.047) and overnight (p= .000). These results suggest a difference in infant sleep duration between groups. BFF infants' shorter overall sleep duration could play a role in increasing the risk of obesity among African American children.

Parasite Infection, Group Size, and Feeding Behavior in Grant's Gazelle

Caroline Shearer, Foundation Fellow
Dr. Vanessa Ezenwa, Ecology, Odum School of Ecology

Group size is known to affect feeding behavior in animals because individuals living in larger groups benefit from the vigilance of others which frees up more time for feeding. Thus, group size influences the way animals distribute their time among various behaviors, and typically the time spent by animals feeding increases with group size. This study examines whether parasite infection modifies the relationship between group size and feeding behavior. Female Grant's gazelles (*Nanger granti*) were treated with an anti-parasitic drug to reduce their nematode parasite burdens, and the feeding behavior of treated and untreated individuals was tracked through time. Using data on the duration and occurrence of feeding behavior, we tested the hypothesis that parasite treatment eliminates the relationship between group size and feeding. Results of this study will increase our understanding of the factors that determine group size in wildlife.

Proteomics of CBL0137-Treated *Trypanosoma brucei*

Shanlin Shoemaker, CURO Research Assistant
Dr. Kojo Mensa-Wilmot, Cellular Biology, Franklin College of Arts and Sciences

Human African Trypanosomiasis (HAT) is a parasitic disease endemic to parts of sub-Saharan Africa. The disease-causing protozoan, *Trypanosoma brucei*, proliferates in the blood, lymph, and ultimately the central nervous system of both humans and cattle. Nearly 70 million people are at risk of contracting HAT, which is fatal without treatment. Drugs currently used to treat HAT are toxic and difficult to administer, highlighting a need for the discovery of safer and more effective drugs. We identified Curaxin-137 (CBL0137) as a lead anti-HAT drug. This orally bioavailable drug cures mice infected with *T. brucei* and has completed phase I clinical trials for other indications, making it an excellent "drug repurposing" candidate for treating HAT. A 6-hour CBL0137 treatment of *T. brucei* in vitro followed by a 48-hour incubation in drug-free media revealed a "delayed killing" effect, suggesting that *T. brucei* commits irreversibly to death within the first few hours of exposure. In this study, we aim to understand why this drug is successful in killing *T. brucei* by identifying changes in the proteome of CBL0137-treated trypanosomes compared to untreated trypanosomes. We will first compare the protein profiles of treated and untreated trypanosomes using a combination of silver staining and phosphoprotein staining. Then, we will identify specific proteins affected by CBL0137 treatment through mass spectrometry. Determining the possible protein effectors of CBL0137 may reveal essential proteins in the trypanosome that may be tested genetically, thereby validating new targets for drug development to cure HAT.

Formation of Natural Product Glucosides by *Escherichia coli* in Controlled Conditions

Kimberly Mercedes Shumaker, CURO Research Assistant
Dr. Mark A Eiteman, Chemical, Materials, and Biomedical Engineering, College of Engineering

Flavonoids consist of a large group of natural polyphenols found in fruits, vegetables and cereals. Many possess anti-oxidative and vasodilation effects. Many flavonoids are water insoluble, and bioavailability can be increased through O-glucosylation of flavonoids by the action of enzymes called glycosyltransferases. This research describes the conversion of a model

compound, maltol, into its O-glucoside using UGT73B3 by *E. coli* strains under various fermentation conditions. We compared the production of maltol-O-glucoside by *E. coli* with and without a deletion in the pgi gene coding phosphoglucose isomerase. We also compared the formation of maltol-O-glucoside under nutrient limited growth conditions.

An In Vitro Model Demonstrating the Direct Current Stimulation Mediated Recovery from Neuronal Injury

Naomi Afnan Siddiquee, CURO Research Assistant
Noah Goldstein
Dr. Lohitash Karumbaiah, Animal and Dairy Science, College of Agricultural and Environmental Sciences

The goal of this study is to create an in vitro model of Traumatic Brain Injury (TBI) in order to assess treatments targeted to help repair disrupted neural networks and return lost function. Since moderate-to-severe TBI can cause a surge in glutamate, leaving behind damaged neurons, mouse embryonic stem cell derived neurons were exposed to 100 μM of L-glutamate to mimic the excitotoxicity after a moderate-to-severe TBI. Utilizing a high density Multi-Electrode Array (MEA) recording system, we recorded neuronal activity in a 12 well plate equipped with 64 recording electrodes per well used to record extracellular action potentials (EAP). We then assessed the whole well and electrode specific spiking activity over a period of four weeks. L-glutamate exposure at a concentration of 100 μM two weeks post-seeding resulted in a high Mean Firing Rate (MFR) that sharply declined ($P < 0.001$) and dysregulation of neural networks demonstrated by lower synchrony ($P < 0.01$) by week 4 and less frequent and shorter bursts ($P < 0.001$) by week 3. These electrophysiological changes were accompanied by a subsequent decrease in Beta-3 Tubulin+ neurons ($P < 0.001$) and oligodendrocytes ($P < 0.01$). We propose that the evaluation of these parameters followed by the immunocytochemical evaluation of motor neuron cultures will allow for a robust assessment of the effects of excitotoxicity on neurons, glia, and neuronal network repair in vitro.

Plasma Purification Method for Agglutination Assays in White Ibis

Olivia Lauren Sieverts, CURO Research Assistant
Dr. Sonia Hernandez, Forestry, Warnell School of Forestry and Natural Resources

As the everglades continue to disappear, many species of animals, including the American white ibis (*Eudocimus albus*) are being forced to urbanize. Urbanization may affect pathogen prevalence as these ibis aggregate in large densities, and mixed species flocks for food. Many of these birds are hand fed by people providing an opportunity for pathogen transmission between birds and humans. We used the Elementary Body Agglutination (EBA) assay to determine if the ibis in this study were infected by the zoonotic pathogen, *Chlamydia psittaci*. We used banked plasma for this assay as available; however, the preferred sample for this assay is serum. We obtained a prevalence of infection of X (n=X), which was unexpected. We suspected that the positive results were a result of cross-reactivity between proteins in the plasma and the antigen. Thus, we tested a method to purify immunoglobulin from the plasma. We used an ammonium sulfate solution to precipitate and remove nonspecific proteins present in plasma, to determine if they were interference with our assay. In order to test that we had in fact preserved and concentrated immunoglobulin in our purified sample, the sample was run through a protein gel and transferred onto a cellulose membrane, where it reacted with anti-bird antibodies. Our validation method confirmed successful recovery of immunoglobulins from the plasma. The purified samples were re-tested using the EBA assay—all were negative. Based on these findings we theorize that the initial results were false positives as the purified immunoglobulin samples tested negative.

Fatigue, Executive Functioning, and Activities of Daily Living in Older Adults

Shivani Singh
Dr. Steve Miller, Psychology, Franklin College of Arts and Sciences

Fatigue is a common symptom in a wide cross-section of elderly patients, caused by a myriad of reasons. The purpose of this study was to evaluate how fatigue, a physiological measure, may mediate

the relationship between declining executive functioning (EFs) and activities of daily living (ADLs). The current sample consisted of 189 community-dwelling older adults (ages 54-101, M= 77.94, SD= 8.717). Participants completed the Neurobehavioral Cognitive Status Examination (NCSE), an ADLs Checklist, as well as a Physical Symptoms Checklist. The assessed EF domains included judgment, similarities, and attention. Based on our mediation model, we hypothesized that fatigue would mediate the negative effect of declining EF on functional outcomes (ADLs). Results showed a significant R^2 change when fatigue was included in the model, R^2= .021, F_{change} (2, 187) = 4.765, p= .03, however, there was no significant relationship between fatigue and EF, making it difficult to conclude significant mediation is occurring, r= .059, p= .325. Further exploratory moderation analysis showed that there was no significant interaction effect between EF and fatigue, indicating that the relationship between the EF and ADLs did not change at the level of fatigue, R^2 = .194, F_{change} (3, 186) = .093, p= .760. There was a significant correlation between EF and ADLs, which supports existing literature on functional independence and EF in late life. However, the absence of an effect of fatigue on this relationship may be due to the restricted range of fatigue symptoms in our sample, and limitations of our fatigue measure.

The Chthonic Elements of Mithraic Worship

Michael Sloman
Dr. Charles Platter, Classics, Franklin College of Arts and Sciences

My paper examines how traditionally chthonic elements exist in Mithraism, a Roman cult dedicated to a sun god. It will isolate the specific symbols and practices that are associated with chthonic worship in the scene and examine their role in the Mithraic context as well as the greater religious context of the time period. This paper proposes that these elements are remnants of hero cult, standard across mystery cults in the Greco-Roman world. The Eleusinian Mysteries and the cult of Cybele share similar tropes and scenes and serve as an example for the possible development of this iconography. This question is important because a cosmological interpretation of the Mithraic cult, and therefore its symbols and iconography, has become more widely accepted. Although Mithras is worshipped as the Unconquered Sun, this cosmological interpretation denies half of his divine heritage. We must ask why chthonic elements are so prevalent in the worship of this cult. This paper will argue that these chthonic elements of Mithraism must have grounding in previous religious practice. The notion that they could have spontaneously arisen from nothing is doubtful given the long tradition of religion and cult in the ancient Mediterranean world. More reasonably, they exemplify traditional ritual of mystery cults which mix the heavenly origins of gods with the earthly works of heroes. Although perhaps a product of celestial worship, Mithraism is indebted in its practices to the worship of predecessor deities in Middle Eastern culture.

Phosphorous Efficiency in Cultivated Sunflower

Alex Morgan Smith, CURO Research Assistant
Dr. Lisa Donovan, Plant Biology, Franklin College of Arts and Sciences

Cultivated sunflower, *Helianthus annuus L.*, is an important global oilseed crop. Phosphorus is needed for the normal growth and maturity of this commercial crop, and has been shown to affect yield quality/quantity in sunflower. Historically, breeders prefer sunflowers that have high phosphorous acquisition efficiency (plant uptake per nutrients available in the soil). Unfortunately, global sources of phosphorous are rapidly depleting, which makes genotypes with both high phosphorus utilization efficiency (yield per gram tissue phosphorous content) and high overall yield highly desirable. Furthermore, phosphorous can be allotted differently above than below ground. To get a better understanding of the link between overall yield and phosphorus use efficiency, we measured phosphorus concentrations of 12 diverse lines of sunflower grown under 4 different nutrient treatments. To account for the effect of organ type, we analyzed above and below ground tissue separately. We hypothesized that roots contain more phosphorous than shoots under high-fertility conditions; phosphorous allocation between above ground and below ground matter shift with low-nutrient stress, such that the proportion of root: shoot phosphorous increases

(i.e., more phosphorous will be allocated to roots relative to control); and genotypes with higher phosphorous utilization efficiency: phosphorous acquisition efficiency ratio preform best under low-nutrient conditions. Our results will better inform genetic breeding efforts in cultivated sunflower.

Effects of Vegetation Structure on Nest Predation of Artificial Diamondback Terrapin Nests

Kayla Jordan Smith, CURO Research Assistant
Dr. John Maerz, Forestry, Warnell School of Forestry and Natural Resources

Nesting is an important component in animal life cycles. Human activities often interrupt nesting behavior by degrading nesting habitats. For turtles, altering vegetation structure can increase predation rates. Diamondback terrapins (*Malaclemys terrapin*) occupy salt marshes, nesting in sparsely vegetated areas above high tide. Terrapin females show nest-site fidelity, and may continue nesting in human-degraded areas. My objectives are to: evaluate the effect of shrub habitat maintenance on terrapin nest predation; determine whether spatial patterns of vegetation-driven nest predation contributes to terrapin population decline; and evaluate whether vegetation management improves terrapin nest survival. Building off of long-term terrapin studies on the Jekyll Island Causeway (JIC) and a dieback of Northern raccoons (*Procyon lotor*), I measured predation rates using artificial nests in hedgerow, cleared hedgerow, and open, sparse vegetation. Using the results, spatial patterns of nest mortality along the JIC were used in a population viability analysis to estimate terrapin population persistence. I found predation rate on nests in hedgerows (62.5% of nests) was double that of nests in open sites (31.7%), while rates in cleared hedgerow remained high (71.5%). Nest predation was 39% lower (45.7% of nests) compared to a 2013 study at the same locations (75.4%), consistent with local raccoon dieback. These results confirm vegetation structure as a driver of unsustainable predation, and natural raccoon dieback or culling can significantly improve nest survival. Despite effects of vegetation on nest predation, vegetation removal may not immediately reduce predation. Future research is needed to determine long-term benefits of vegetation management.

Affect of Capsiate on Perirenal and Epididymal Fat in Rats Fed a High Fat Diet

Sierra Megan Smith
Dr. Buffy Howerth, Pathology, College of Veterinary Medicine

Obesity has become an epidemic in many parts of the developed world. Because of its relatively recent emergence, scientists have been looking for a remedy to help people who are suffering from the disease. This project aims to evaluate whether oral capsiate can ameliorate the effects of a high fat diet. The specific objective in this project was to evaluate the size and number of fat cells in epididymal fat and perirenal fat of rats on a high fat diet supplemented with capsiate. The anticipated findings are that capsiate will reduce the size and number of fat cells in rats on a high fat diet. Fat cells were evaluated in epididymal and perirenal fat in fixed tissue that was paraffin embedded, sectioned and stained with hematoxylin and eosin. Digital images from three fields were captured, and the total number of fat cells and cell area were determined. Results will be compared to rats fed a low fat diet and a high fat diet without capsiate.

The Novel Function of RGS10 in Obesity

Isabelle Veigh Snider, CURO Research Assistant
Dr. Jae-Kyung Lee, Physiology and Pharmacology, College of Veterinary Medicine

In previous research exploring the relationship between neuroinflammation and neurogenerative diseases, the Regulator of G-protein Signaling (RGS10) gene was found to negatively regulate microglial activation. In addition to neuroinflammation and damage to their dopaminergic neurons in response to systemic inflammation, RGS10 knockout (KO) mice showed lower levels of glucose in serum and gained more weight while aging. Although there's enough evidence to support a relationship between inflammation and metabolic diseases, detailed mechanisms are still unclear. Our objective is to investigate the role of RGS10 in this relationship. RGS10 KO and wild type (WT)

mice were fed a low fat (LF) diet and a high fat (HF) diet for eight weeks. We performed glucose tolerance and insulin sensitivity tests along with monitoring their weight and collecting serums and tissues at the end of 8 weeks. On both diets, the RGS10 KO mice displayed impaired glucose tolerance. On the HF diet, the KO mice displayed impaired insulin tolerance and higher body weights than WT mice, implicating that the RGS10 plays a role in metabolism and obesity. We're currently processing adipose and liver tissues and extracting the RNA in order to perform quantitative real-time PCR to determine the detailed mechanisms. We'll compare the mRNA expression of metabolism-related genes including sterol receptor element binding protein 1c (srebp1c), peroxisome proliferator-activated receptor-gamma (PPAR-g), fatty acid synthase, adiponectin, and leptin. We hope to gain a better understanding of the mechanism of metabolic disorders so that a treatment can be created to prevent or mitigate the disease.

Designing Relevant In Vitro Models of Muscle Metabolism with Inclusion of Energy Expenditure

Madeleine Holden Snidow, CURO Research Assistant
Dr. Chad M Paton, Foods and Nutrition, College of Family and Consumer Sciences

Typical protocols for in vitro studies of lipid metabolism use free fatty acids (FFA's) as the lipid source, whereas in vivo, triglycerides (TG) are the predominant lipid. In the absence of increased energy expenditure (EE), the study of lipid metabolism in vitro is unlikely to reflect in vivo metabolism. We hypothesized that a more realistic replication of in vivo metabolism should use TG and not FFA and incorporate EE. C2C12 muscle-like cells were used to assess differences in response to FFA versus TG. Cells were treated for 4h with either 16:0, 18:1, 18:2n6, or 18:3n3 as FFA or TG alone or in the presence of AICAR (an adenosine monophosphate mimicking molecule). Total mRNA and protein were collected to assess changes in gene and protein expression respectively. Studies are ongoing, however preliminary results suggest that FFA's produce numerous changes in C2C12 cell functions including inflammation, cell stress, and oxidation with only minor changes associated with TG's. In the presence of AICAR, TG effects are noted and FFA's are somewhat blunted. These results suggest that EE may drive metabolic function in vitro and may provide a more realistic foundation for assessing lipid metabolism compared to simple addition of FFA's. This in vitro discovery plays an essential role in better understanding metabolism and the way human muscle processes lipids. The study of TG's impact on muscle cells provides a better reflection on the true physiological response of FFA metabolism and helps to refine procedures for in vitro models of discovery.

Automatic Recognition of Periocular Facial Alterations

Ryan Snowden, CURO Research Assistant
Erica Anstey
Dr. Larry Hornak, Electrical and Computer Engineering, College of Engineering

Currently, there is no rapid, automated, repeatable method to detect and quantify periocular changes from chemodenervation. Multi-spectral imaging, including the visible, near and short-wave infrared spectrum, may provide novel information. We aim to detect and quantify periocular change, including position and texture changes, over time in participants who underwent periocular rejuvenation with BOTOX injection. Using eye location algorithms developed in MATLAB, face images of subjects are registered and cropped to the periocular region. These face images were captured immediately before and after injection, then at 1 day, 1 week, 1 month, 3 months, and 6 months. Different camera sensors were used to collect the aforementioned data including the visible, near and short-wave infrared bands. The individual regions where BOTOX was injected (corrugator supersilii, procerus, and orbicularis oculi muscles) are extracted and geometrically normalized via a set of algorithms. The normalized regions are processed using an algorithm that compares the extent of texture-based facial alterations before and after treatment. It is expected that most change will occur along the upper brow in the furrow region and in the crow's feet region, although the extent of these texture changes will continue being analyzed through the usage of more sophisticated image processing algorithms. The ability to objectively quantify subtle position and textural changes in

the periocular region in an automated, reliable way has vast potential. For example, detection of subtle change may lead to earlier cancer diagnosis, or even guide cancer resection.

Investigating CRISPR/Cas9 as a System for Gene Editing in *Trypanosoma cruzi*

Lilith Renae South, CURO Research Assistant
Dr. Rick Tarleton, Cellular Biology, Franklin College of Arts and Sciences

Trypanosoma cruzi is the protozoan responsible for human Chagas Disease. This disease is prevalent in Latin America and has no vaccine or effective drug treatment. Development of new drugs and vaccines has been hobbled by the difficulties of genetic manipulation which could lead to better understanding of the complex parasite biology. CRISPR (clustered regularly interspaced short palindromic repeats)/Cas9 (CRISPR associated gene 9) is a useful gene editing system recently borrowed from bacteria and widely applied to efficiently manipulate the genomes of many diverse species. The system utilizes a nuclease Cas9 protein and a guide RNA which directs Cas9 to cut a target gene. We have previously shown that SpCas9 protein, derived from *S. pyogenes*, can be expressed by *T. cruzi* and used to target parasite genes for editing. Although this method is relatively effective, expression of SpCas9 is somewhat toxic to *T. cruzi*. Here we show that the smaller recombinant SaCas9 protein from *Staphylococcus aureus*, but not SpCas9, can be electroporated into *T. cruzi* for effective gene editing. This procedure has shown nearly 100% knockout (KO) efficiency using a fluorescent reporter protein. SaCas9 fused to GFP – thus creating a protein comparable in size to SpCas9 – also fails to achieve reporter gene KO. These experiments demonstrate a new and highly efficient gene editing protocol for *T. cruzi* that depends on the ability of the smaller SaCas9 protein to traverse the *T. cruzi* cell membrane that appears impermeable to the larger SpCas9 protein.

ROS-Responsive and pH Inhibiting Polymer Nanoparticle Platform for Cancer Treatment

Jonathan Spagnoli, CURO Research Assistant
Dr. Jin Xie, Chemistry, Franklin College of Arts and Sciences

Cancer is a deadly disease ravaging the lives of many people around the world. As a result, there is a significant need for new research and treatment methods aimed at inhibiting the growth of cancer cells while maintaining as much healthy tissue as possible. This study aims to determine the anticancer activity of intracellular pH change by utilizing the higher hydrogen peroxide levels in cancer cells as a substrate in a reaction including ethanol and $FeCl_2$, which react to form acetic acid in the cellular environment. Ethanol, ferric chloride, and PVA (an emulsifier) will be loaded into poly(lactic-co-glycolic acid) (PLGA), which is FDA approved, to generate nanoparticles small enough to diffuse through the cellular membrane of cancer cells. Experiments will be performed to design an optimized synthesis protocol with the aim of loading the maximum amount of substrate and generating nanoparticles at about 200nm or less. Size and morphology of the synthesized nanoparticles will be determined by dynamic light scattering (DLS) analysis and a scanning electron microscope (SEM), respectively. Cell viability studies will be performed on glioma and hepatoma cells to determine the anticancer effect of the designed system. Overall, our work suggests that the resulting nanoparticle platform is a promising tool for uniquely exploiting biologically relevant concentrations of H_2O_2, and thus can be used as a new platform for cancer treatment.

Morphological Attributes Underlying Feeding Ability in Burying Beetles

Madeline Sparks
Dr. Allen J Moore, Genetics, Franklin College of Arts and Sciences

Adaptive evolution leads to differences in morphology and behavior between species. During development, the differences that arise in behavior are often accompanied by morphological differences, creating unique functional phenotypes. In this study, we look at a behavioral and morphological disparity between the larvae of two species of burying beetles (*Nicrophorus*). *Nicrophorus vespilloides* possess the ability to self-feed in the first instar, while *Nicrophorus orbicollis* do not until the second instar. We examine differences in mouthpart morphology to account for this difference in behavior. We find that *N. vespilloides* larvae have serrations on the inner edge of their mandibles at the first instar, while *N.*

orbicollis larvae do not. *N. Orbicollis* larvae have smooth mandibles, and do not develop the serrations until the second instar. There are no allometric differences in the mandibles between species. Therefore, we suggest that heterochrony in the development of mandibular serrations is directly correlated with the ability to self-feed.

Homeschooling and Its Effect on the Parent-Child Relationship

Maggie Spears, CURO Research Assistant
Dr. Jennifer L George, Child and Family Development, College of Family and Consumer Sciences

Homeschooling offers families a diverse and flexible option when it comes to educating their children. It also creates a unique familial situation in which one or both parents act as both guardian and teacher, facilitating, and personally guiding their child's education. Considering the unique challenges and benefits that homeschooling seems to offer families and individuals it remains largely unstudied. This exploratory study aims to examine homeschooling and how it affects parent-child relationships. Parent-child relationships will be assessed by interviewing emerging adults, between the ages of 18-25, who were homeschooled, to answer broad questions about homeschooling and their relationship with their parents. Qualitative data will be gathered from personal interviews with the research team. Once data from interviewees is gathered it will be analyzed using themed coding. Results will be discussed based on themes found in the data. This study aims to shine a light onto the understudied homeschooling population and contribute to the scientific communities' understand of how homeschooling effects individuals, families, and communities.

Standards for Metakaolin Supplementation into Georgia DOT Concrete

Kevin Elliott Spicer, CURO Research Assistant
Dr. Mi Chorzepa, Environmental, Civil, Agricultural, and Mechanical Engineering, College of Engineering

This research seeks to find standards for the incorporation of metakaolin as a supplementary cementitious material (SCM) in concrete mixtures. Ultimately the standards should show conclusive proof that metakaolin can be adapted to the Georgia Department of Transportation (GDOT) Standard Specifications. In the past, the demand for metakaolin as a SCM was low because other SCM like fly ash and blast furnace slag were widely available and useful in Georgia. However, with the way the energy sector is transitioning, the availability of fly ash (a byproduct of coal combustion) has drastically decreased. Fly ash is important because, when added to the concrete mixture in certain amounts, it reduces heat of hydration leading to fewer cracks and higher ultimate strength. The GDOT seeks to catch up to current research that is evaluating the use of metakaolin as a SCM so that they can have a stronger, more cost effective, and more durable concrete. Metakaolin contributes to concrete properties in different ways than fly ash. This study is important so that thresholds and controlled standards for the incorporation of metakaolin as an SCM can be evaluated and declared. The successful completion of this research will provide an economical and widely available alternative to the current SCMs being used in the state of Georgia.

Limb Elevation as a Model of Peripheral Arterial Disease

Diana Springer, CURO Research Assistant
Dr. Kevin McCully, Kinesiology, College of Education

Peripheral arterial disease (PAD) is an age-associated condition that limits blood flow primarily in the legs. The influence of restricted blood flow can be difficult to study in PAD due to comorbidities. Limb elevation has been proposed as an alternative method of studying the effects of PAD on muscular function. This study evaluates the medial head of the gastrocnemius muscle in young, healthy adults with the leg in three different elevations above the heart (2, 30, and 60cm). Blood flow and oxygen saturation during exercise via electrical stimulation is measured using near-infrared spectroscopy (NIRS). Using surface mechanomyography, muscular endurance is measured at 2, 4, and 6 Hz of electrical stimulation. Comparisons are then made between the measurements at each elevation as well as correlations between perfusion and muscle endurance. We hypothesize that limb elevation

will reduce muscle blood flow and reduce oxygen levels during electrical stimulation. With lower oxygen levels, we hypothesize that muscle endurance will be reduced. Our primary aim is to test the influence of reduced blood flow (due to elevation) on the measurement of muscle endurance. In addition, if limb elevation does provide a good model of PAD, future experiments evaluating treatments (including exercise training) for reduced blood flow and PAD will be possible. Limb elevation experiments could then be performed on older adults with comorbidities and intact circulation to better understand PAD.

Mentoring as a Protective Factor of the Association between Child Maltreatment and Substance Use in Adolescence

Jordan Srochi, CURO Research Assistant
Dr. Assaf Oshri, Child and Family Development, College of Family and Consumer Sciences

Maltreated youth are at significant risk for substance use behaviors in adolescence. Although role models have been shown to facilitate positive youth development (PYD) among at-risk and maltreated youth, less is known about what types of adult mentorship can buffer the link between child maltreatment and adolescent drug use. In this research study, a secondary data analysis will be conducted to examine how mentors or role models buffer the relationship between adverse childhood experiences, such as maltreatment, and substance use behaviors in adolescence. The present study will utilize three time points from the LONGSCAN study, which includes data from maltreated and non-maltreated youth and their caretakers (N = 1,354). A structural equation model will be used to compare protective effects of different mentoring experiences (i.e., natural mentors, program mentors, or both). I hypothesize that utilization of any type of mentor would lower substance use for children who experienced maltreatment, and that natural mentors would have more of a protective effect than program mentors. Preliminary results indicate that both natural and programmatic mentors buffer the relationship between maltreatment experiences and substance use. This study is important in order to target appropriate interventions aimed at reducing substance use and promoting resilience among at-risk youth.

A Movie without a Hero: Casting Becky Sharp in Early Hollywood Cinema

Gabrielle Stecher, CURO Research Assistant
Dr. Tricia Lootens, English, Franklin College of Arts and Sciences

This interdisciplinary project explores early film adaptations of William Thackeray's 1848 novel *Vanity Fair* in attempt to determine the ways in which the enigmatic Becky Sharp was translated, successfully or not, into early Hollywood cinema. This particular novel and its leading lady inspired the production of various film adaptations from 1911 to 1935, including four silent films and the first film shot in full-spectrum Technicolor. Yet, the casting of Miss Sharp was no easy feat— the Becky of the novel wavers between charming coquette and femme fatale in a way that, at times, seems almost impossible for a camera lens to capture completely. This project investigates the 1932 adaptation of *Vanity Fair* starring Myrna Loy as Miss Sharp as a pre-code exploration of seduction and control that succeeds in fully realizing novel Becky's transformation from wily coquette to psychologically manipulative vamp. After comparing this film to its similarly pre-code precursors, I pit pre-code performances of Becky against the post-code exploration of Miss Sharp in the Technicolor world of the 1935 adaptation *Becky Sharp* in attempt to understand the combined influence of casting decisions and the censorship of the Hays Code on the performances and critical reception of this infamous female lead. Ultimately, a feminist theoretical lens will be applied to my study of the adaptations in order to reveal how the Hays Code and early twentieth-century audiences conceived the cultural ramifications of the temptress on-screen.

Carbon Monoxide Line Emission from Region of Molecular Cloud MBM 55

Amanda Stricklan, CURO Research Assistant
Dr. Loris Magnani, Physics and Astronomy, Franklin College of Arts and Sciences

We are analyzing the CO line emission from a region containing a translucent molecular cloud MBM 55. Over 1000 spectra were taken with the Arizona Radio Observatory 12 meter mm-wave radio telescope on Kitt Peak. The data were part of a project to compare sensitive CO observations

from 88 lines of sight through and around the cloud in an effort to determine how much low-level emission there was from the environs of the cloud core. To do this each of the 88 points was "mapped" using a 13-point pattern. For the original project, the 13 points were added together to produce one final spectrum for each of the 88 points. Our project is to look at each of the 13 paintings individually to see how the CO emission varies on small scales (the beam size is about one arc minute which corresponds to a linear size of about 0.03 parsecs at a distance of 100 parsecs). In addition to seeing how the CO line varies on small scales, we are also looking for individual points with isolated line emission. It is conceivable that some of the 88 lines of sight with non-detections, when all 13 points are added together, may have detections along a single or at most 2-3 lines of sight. By adding a few weak signals with about 10 lines of sight of non-detections, we will be able to determine the smallest connected regions with CO emission.

Bacteria-Phytoplankton Interactions in Understanding the Marine Carbon Cycle

Stephanie Stromp, CURO Research Assistant
Dr. Mary Ann Moran, Marine Sciences, Franklin College of Arts and Sciences

The marine carbon cycle is of major significance on a global scale. With the ever-increasing pressure of climate change, understanding factors that affect carbon flux in the ocean has become more important. The transfer of dissolved organic carbon from phytoplankton to marine bacteria is a major step in the marine carbon cycle, but many key compounds that link phytoplankton and bacteria through trophic interactions are unknown. A model microbial system using the marine diatom *Thalassiosira pseudonana* CCMP1335 and the marine bacterium *Ruegeria pomeroyi* DSS-3 is being used to investigate phytoplankton metabolites passed to bacteria. Genes encoding transporter proteins that were highly upregulated in the model system were identified previously. This project tests whether mutants with deletions in three of the highly upregulated transporter systems grew more poorly on phytoplankton-derived substrates than wildtype bacteria. Mutants for a sulfonate dihydroxypropanesulfonate (DHPS) transporter, a glycine betaine/proline transporter, and a possible allophanate transporter were used to compare growth differences of mutants compared to the wildtype strain. Growth was measured by optical density and flow cytometry. Decreases in observed growth rates for the mutant cultures compared to wildtype are being used to estimate the importance of each substrate as a source of carbon to bacteria growing on phytoplankton metabolites. Future studies will identify the importance of these compounds for natural bacterial communities inhabiting the surface ocean, and help in understanding importance of microbial interactions to carbon flux in our oceans.

In Vivo Assessment of Olfactory Receptor Neurons and Projection Neurons Using Appetitive Olfactory Inputs in *Drosophila* Larvae

Rajeev Subu, CURO Research Assistant
Dr. Ping Shen, Cellular Biology, Franklin College of Arts and Sciences

How smell or taste is translated into appetitive behavior remains poorly understood. *Drosophila melanogaster* has proven to be a powerful model to manipulate and to examine reception and perceptual processing of appetitive olfactory inputs in higher-order olfactory centers. In *Drosophila* larvae, olfactory information is encoded in the antennal lobe where the olfactory receptor neurons form a network with projection neurons in a one-to-one relationship in a complex sensory encoding system. It has been found that *Drosophila* larvae display impulsive feeding of sugar-rich food when presented with appetitive odors, such as pentyl acetate (PA) and 1-octanol (OCT). This finding has prompted us to investigate the potential functional differences in the brains of the third-instar larvae that are treated with distinctive appetitive odors through fluorescence-based imaging analysis. We will first screen for the ability of different appetitive odors to induce neuronal activity using CaMPARI. Following this, laser lesioning of neurons will be used on the screened projection neurons. We hope to determine which specific olfactory receptor neurons and their projection neuron counterparts are responsible for the appetitive odor-induced behavior through the use of behavioral assays using the odors. The successful outcomes from

this proposed study may help us better understand the olfactory circuits in higher-order organisms.

Open Versus Structured Rules: Examining the Policy Effects of Rule Choice in the House of Representatives, 2003-2016

Jessica Jin Suh, CURO Research Assistant
Dr. Anthony Madonna, Political Science, School of Public and International Affairs

This research examines the usage of special rules in the US House to restrict amending activities. Scholars have argued that the House majority party can bias policy output away from the floor median through the usage of restrictive rules, including both structured and closed rules. Scholars suggest that as a result, majority party centrists can incur a policy loss from restrictive rules. I argue that structured rules vary in their ability to restrict amending opportunities, distinguishing between that of closed rules. Accordingly, I argue that in order to secure the passage of restrictive rules, the majority party often makes concessions to majority centrist members through amending opportunities. To test my theory, I build off an earlier study that examined a new dataset of proposed amendments from the 109th to the 111th Congresses under structured rules. For each amendment, the amendment proposal, allowance, and adoption for each House were coded. This research extends that dataset to include amendments from the 108th, 112th, 113th, and 114th Congresses. Additionally, I include all amendments to bills considered under open rules. These amendments under open rules serve as a control group of sorts for my study.

Evolving Racial Perspectives in Haiti, 1785-1820

Christian Michael Sullivan
Kathryn Kostel
Dr. Jennifer Palmer, History, Franklin College of Arts and Sciences

This presentation analyzes contemporary perceptions of the relationship among race, politics, and socioeconomic classes during the Haitian Revolution. The goal of this project is to display that power struggles and economic inequalities served to prolong the conflict and overshadow the inherent racial disparities within Haitian society. The research was done by analyzing treatises and newspaper articles written by European observers. White observers highlighted the strenuous power struggles and economic inequalities alongside racial disparities. They recognized that the Haitian Revolution was not simply a conflict between French plantation owners and their slaves; rather it was a conflict with constantly dynamic opponents. As conflict unfolded, observers tended to shift towards viewing the war as a struggle for economic equality and control. Thus, a conflict that might initially appear on the surface to be only about race was actually a complex and dynamic power struggle that had economic and political inequalities at its core.

Nitrogen Use Efficiency across Soil Fertility Treatments in Cultivated Sunflower

Becca Sussman, CURO Research Assistant
Dr. Lisa Donovan, Plant Biology, Franklin College of Arts and Sciences

Cultivated sunflower, or *Helianthus annuus L.*, is heavily dependent on access to nutrients for proper growth, with Nitrogen being one of the main limiting nutrients available for sunflowers. Sufficient N treatments have been found to increase crop productivity and yield. In our study, we examined how nutrient utilization efficiency (NUE) and nutrient acquisition efficiency (NAE) contribute to sunflower productivity. NUE refers to the amount of mass produced in relation to the amount of nutrients the plant obtained. NAE refers to the amount of nutrients the plant obtained in relation to the amount of nutrients available to the plant. Furthermore, we studied root systems and shoot systems separately to differentiate between the harvestable crop and the soil-bound portions of the plant. Plant tissue from 12 diverse lines of cultivated sunflower grown in a randomized complete block design under 4 nutrient treatments were ground and then analyzed for N content. We hypothesized that: roots will contain more nitrogen than shoots under high-fertility conditions; nitrogen allocation between above and below-ground matter will shift with low-nutrient stress, such that the proportion of root:shoot N will decrease; and genotypes with a higher NUE:NAE ratio to perform best under

low-nutrient conditions. From our results, we will be able to inform genetic breeding efforts of low-input sunflower cultivars.

Cognitive Control Differences in Bipolar Disorder in the Presence or Absence of Psychosis

Jane Sutcliff
Dr. Jennifer McDowell, Psychology, Franklin College of Arts and Sciences

Cognitive control is responsible for attention, inhibition, and working memory. Rapid eye movements called saccades have been used to index both the behavioral and neural processes underlying cognitive control. Prosaccade tasks index automatic-like orienting responses by requiring subjects to glance toward a suddenly appearing visual stimulus. Antisaccade tasks index the inhibition of automatic–like orienting responses by requiring subjects to look away from the sudden visual stimulus. Both tasks have been extensively used to study cognitive control deficits in people with psychosis, which are often manifested as higher antisaccade error rates, slower correct antisaccade latencies, and sometimes faster prosaccade latencies. Bipolar disorder can be manifested with or without psychosis symptoms, but it is unclear if deficits in saccade performance by people with bipolar disorder with psychosis also exist in the absence of the same disorder without psychosis symptoms. In this study, healthy comparisons (n=81), people with psychotic bipolar disorder (n=51), and people with non-psychotic bipolar disorder (n=62) completed pro- and anti-saccade tasks. We analyzed the three aforementioned saccade metrics used to index cognitive control in people with psychosis. Differences were assessed with one-way ANOVAs on all three metrics. Preliminary analyses show no significant differences between antisaccade reaction times. Antisaccade error rates in healthy controls were significantly different from both BD-P and BD-NP groups, although BD-P and BD-NP were not significantly different from each other. This indicates that although there are slight disparities in cognitive control between groups, the cognitive deficits between psychotic and non-psychotic bipolar disorder are not significantly different.

Clay Abyss: Underclays of the Şile Region Critical Zone

Sam Svoboda
Dr. Paul A Schroeder, Geology, Franklin College of Arts and Sciences

The Şile region of Turkey contains large amounts of economically significant clay deposits used mainly in the ceramics industry. These clays originate from the weathering of the Upper Cretaceous indurated and altered volcanic andesite in the paleo-lacustrine of the region. This research hypothesizes that composition of the plastic underclays will vary along a gradient that transitions from oxidized to reduced zones. Methods employed to measure the clay fraction include X-ray diffraction (XRD) using treatments of sodium (Na^+), magnesium (Mg^{2+}), and potassium (K^+) cation saturations. Saturations were examined using oriented slides in XRD in their air-dried, ethylene glycol, and heated (330 °C) states. Phases identified included quartz, kaolinite, discreet illite, mixed-layer illite-smectite (I-S), goethite, hematite, and bayerite. Simulations using NEWMOD® indicated the I-S is randomly ordered with a greater than 50% smectite. As depth increases in the critical zone below the oxidation front I-S decreases in abundance. There is a loss of smectite and goethite in the reduction zone. The crust layer is goethite-rich underclay, which marks the extent of the weathering front. This study suggests that significant weathering occurred deep under the surface leading to a low abundance of smectite and goethite with depth and the presence of bayerite. Greater concentrations of I-S were found to occur in the oxidized zone compared to the reduced zone. The suitability of the clays for industrial ceramic applications may therefore be influenced by the extent of modern post-depositional alteration in the critical zone.

Effects of Condense Tannins from *Lespedeza cuneata* on Oxidative Stress in Horses

Cody Alan Swint
Dr. Kylee Duberstein, Animal and Dairy Science, College of Agricultural and Environmental Sciences

Gaining popularity due to its anthelmintic effects in small ruminants, sericea lespedeza (*Lespedeza cuneata*) is becoming increasingly common and more readily available on the feed market. Sericea lespedeza is a legume that, when harvested correctly, has a high nutritive value. It is believed to have high levels of condensed tannins, which is what most researchers think causes the anthelmintic effects in small ruminants. Health benefits from lespedeza, such as reduced oxidative stress and treatment of inflammatory conditions, have been documented in humans. As well as the health benefits shown in humans, sericea lespedeza has a nutrient profile comparable to other high quality equine forages, and may prove to be advantageous as a feed source if it is able to reduce oxidative stress in performance horses. The objective of this study was to determine if incorporating sericea lespedeza hay into equine diets improved antioxidant capacity and reduced oxidative stress in response to a bout of moderately intense exercise. Twelve horses were used in a 6 week feeding trial, during which time half of the horses were fed 1% of their body weight daily in sericea lespedeza hay and the remaining six were fed 1% of their body weight daily in Russell bermudagrass. At the conclusion of the feed trial all twelve horses underwent an incremental standardized exercise test (SET). Blood was collected pre and post SET and tested for antioxidant capacity via assaying total, reduced, and oxidized glutathione, as well as markers of lipid and protein oxidation.

Hunting for Homology: The Role of Working Class Pride in Modern Skinhead Subcultures

Ryan Switzer, CURO Research Assistant
Dr. Cas Mudde, International Affairs, School of Public and International Affairs

The skinhead youth subculture has spent nearly fifty years divided. Beyond the classic Neo-Nazi skins popularized in film and news media, the skinhead community boasts an ideologically diverse corps ranging from SHARP (Skinheads Against Racial Prejudice), to apolitical skins, to gay skins, to Christian skins. This multiplicity of internal factions has led scholars to declare that the skinhead subculture has failed in achieving homology. The thinking goes: "beyond classic skinhead fashion and rowdy music, there is little that holds the community together." I argue that the Doc Martens and Oi! music hold the symbolic key to the subculture's homogeneity. Regardless of the skinhead's ideology, their aesthetic displays working class pride. It is the proletariat disposition that holds the skinhead community together. This study captures the multiplicity to the skinhead youth subculture, while identifying the factors that bind them in the contemporary world. In line with post-subcultural theory and Bauman (1998) globalization provokes multi-faceted transformations. The political, economic, and social alienation that led to the original emergence of skinhead subculture is amplified in its modern precarity (Butler 2013). Through an ethnographic, qualitative analysis of scholarship, skinhead biographies, fanzines, online forums and discography I trace the roots of skinhead proletariat pride from its roots in mid-century United Kingdom to its current fragmented state. I conclude by discussing my finding's implications for our understanding of post-subcultural value systems, cross-class alliances and the mission of white nationalist skins. This study adds to the neglected body of literature concerned with the relationship between aesthetics and politics.

Congressional Complexity: Modernizing Financial Legislation

Andrew Michael Teal
Dr. Anthony Madonna, Political Science, School of Public and International Affairs

The Financial Services Modernization Act of 1999 was acclaimed by both Republicans and Democrats as necessary legislation to push America's economy forward. The Act repealed key elements of the 1933 Banking Act (or "Glass-Steagall Act"). However, following the 2008 financial crisis, many politicians and political observers changed their tune and suggested the repeal played a causal role in the financial crisis of 2008 (see e.g. Stiglitz 2010). When considering the perceived failure of the Financial Services Modernization Act of 1999 (or "Gramm-Leach-Biley Act"), one must consider the complexity of the measure. Like most legislation related to banking, the Act required a great deal of specialized knowledge to comprehend. Accordingly, I argue that the high costs of specialized knowledge have increased over time as Congress has taken on more issues. Accordingly,

this increased difficulty for members of Congress to participate in the drafting and consideration of the act. This led to a great deal of deference being given to special interests and lobbyists who possess knowledge on this subject. Using a dataset compiled by the University of Georgia Congress Project, I examine all amendments to the Financial Services Modernization Act and other landmark financial reform bills. I argue that the average number of floor amendments offered to these measures has decreased over time. Further, I argue that the few amendments offered are significantly more likely to be offered by Banking Committee members who receive a great deal more in campaign contributions from the financial sector than other members.

Ferrohydrodynamic Separation of Prostate Circulating Tumor Cells

Chase Tenewitz
Dr. Leidong Mao, Electric and Computer Engineering, College of Engineering

Prostate cancer, the second leading cause of cancer death in men, is an uncontrollable propagation of cells in the prostate gland. As a disease that can be treated with the correct therapies, a search for a reliable, accurate biomarker that can predict responses to a treatment has begun. In addition, a need for an accurate biomarker that can provide a prognosis for the patient is needed. Circulating tumor cells (CTCs), cells that are shed from a primary tumor site that travel in the peripheral blood, can provide a marker of prognosis through their enumeration and molecular analysis. Our microfluidic device, which incorporates the principles of ferrohydrodynamics, can be used as a dependable resource to extract the CTCs from blood due to its low-cost, label-free, easy usage, high throughput and high efficiency.
Viability was tested with a control group and a group after cell separation. The separation experiment was conducted using a syringe pump with a flow rate of 100 μL/min with 100 CTCs spiked into 1 mL of blood. The cell separation efficiency was calculated by dividing the number of target cells found after separation by the number of cells spiked in the blood sample. This device successfully separated PC-3 cells at a separation efficiency of 82%. With the biocompatible ferrofluid, the cells remained viable after separation from the WBCs. Because this device is label-free and the cells remained alive, further analysis can be done on the CTCs.

The Contribution of Double Electron Capture Processes to Charge Exchange with Multielectron Targets

Jason Terry, Foundation Fellow
Dr. Phillip C Stancil, Physics and Astronomy, Franklin College of Arts and Sciences

Previous investigations into charge exchange and its applications to X-ray spectroscopy have tended to focus almost exclusively on single electron capture processes. Mounting evidence suggests that ignoring the contribution of double electron capture will yield inaccurate results. Accordingly, charge exchange cross sections for single and double electron capture are calculated using multichannel Landau-Zener theory for the system Ne^{10+} + He. (n,l,n',l')-resolved double electron cross sections are generated then used in conjunction with branching ratios to determine cross sections for double capture with and without autoionization. These cross sections are used to generate X-ray spectra for each of the processes. Results indicate that the inclusion of double electron capture events is important for some collision energies where they can redistribute the cross sections from the intermediate energy states towards both higher and lower energy states.

Studying Gene Flow in *Boechera stricta* to Understand the Impacts of Climate Change

Sunishka Thakur, CURO Research Assistant
Dr. Jill Anderson, Genetics, Franklin College of Arts and Sciences

Climate change is imposing novel patterns of selection on natural populations, influencing both the ecology and evolutionary dynamics of plants and animals. To investigate the effects of climate change on plants, we study *Boechera stricta* across elevational gradients, where conditions range from hot and dry in low sites to cool and moist in higher sites. This plant is an exceptional model species because it has adapted to variation in climate that it experiences across broad elevational and latitudinal gradients in nature. To investigate the extent to which climate change will alter trait

evolution, we have transplanted individuals from across the range into five common gardens. During the growing seasons, we measure fitness and other life history traits and collect samples to quantify morphology. During the academic year, we measure phenotypes on these collections, such as leaf morphology and seed physiology. We then use molecular tools to understand the rate of gene flow across these populations. We will use genome-wide association studies to map QTL (quantitative trait loci) for traits. The question we seek to answer is whether gene flow will promote adaptive responses to climate change by moving alleles from drought-adapted populations from the lower elevations into the higher elevation populations. This is how higher elevation plants could possibly adapt to changes in climate that they will experience in the near future, i.e. a climate similar to the lower elevations. The ultimate goal is to understand whether these plants can keep up with climate change.

Effect of Various Threat Categories on the Spatial Clustering of Threatened Mammals

Sunishka Thakur, CURO Research Assistant
Dr. Patrick Stephens, Ecology, Odum School of Ecology

Studies have found that biodiversity hotspots often include only a small percentage of threatened animals, but a large percentage of all species in the class, for most classes of vertebrates. Further, it has been shown the that there is high congruence among classes of terrestrial vertebrates in terms of spatial distribution of all the species belonging to them, but poor congruence in the spatial distribution of only the threatened species in each class. Based on this observation, it has been hypothesized that a greater congruence among threatened species could be seen if they were grouped according to the major threats affecting them rather than taxonomy. We tested this hypothesis on endangered and critically endangered mammals. The major threat(s) affecting each of these species were identified using the data on the IUCN red list. According to these, the mammals were grouped by categories of "major threats" and by taxonomic group (i.e., orders). We gathered a matrix of pairwise distance between all the species in each category based on the geographic range midpoints reported in the PanTHERIA database. The average of the distances between the range midpoints was taken as a measure of how spatially clustered all the mammals in that category were, in comparison to other categories. The goal was to determine whether mammals showed greater spatial clustering when grouped by source of threat than by taxonomy. We found that there was no significant difference the average spatial clustering of endangered species when grouped via source of threat compared to species grouped by taxonomy. Among sources of threat, species threatened by human showed the greatest spatial clustering (i.e., lowest average distance between the range midpoints of species) indicating that targeted action and awareness at the local and regional level for this issue may yield results that benefit multiple species. Species threatened by habitat loss showed the lowest spatial clustering, suggesting that this is a conservation issue to be tackled more globally.

Discovering the Antimicrobial Effect of the Lactoperoxidase/Hydrogen Peroxide/Thiocyanate System against *Streptococcus pneumoniae*

Rachel Thomason, CURO Research Assistant
Dr. Balazs Rada, Infectious Diseases, College of Veterinary Medicine

We encounter a variety of pathogens each day, and the vast majority, if not all, of people encounter the bacterium *Streptococcus pneumoniae.* While colonization of the nasopharynx in humans is usually harmless, if the bacterium is able to spread to other areas of the respiratory tract a rapid inflammatory response ensues that results in disease. *S. pneumoniae* can result in a large spectrum of diseases such as pneumonia, bacteremia, meningitis and otitis media which collectively makes it one of the leading causes of infectious disease in people of all ages, but is particularly threatening to young children, the elderly, and immunocompromised individuals. Among the many defense systems of the airways, our tracheobronchial epithelial cells express two NADPH oxidases, Duox 1 and Duox 2, proteins that are abundantly expressed and produce extracellular H_2O_2 . Duox1 is part of a three-component system that utilizes lactoperoxidase (LPO) to oxidize thiocyanate (SCN^-) using

Duox1-derived hydrogen peroxide (H_2O_2) in order to produce the antimicrobial anion hypothiocyanite ($OSCN^-$). This system has been shown to inactivate influenza virus and certain bacteria, but no studies have been performed testing this system on *S. pneumoniae*. Our results show that incubating bacteria with the full Duox/H_20_2/LPO/SCN- system compared with bacteria alone demonstrated a strong killing effect. Our objective is to explore the effectiveness of hypothiocyanite produced by the lactoperoxidase/hydrogen peroxide/thiocyanate system in killing *S. pneumoniae*.

Charlie Hebdo: Moral Injury and the Display of Religion in Satirical Press

Chelsea Thorpe, CURO Research Assistant
Dr. David Williams, Religion, Franklin College of Arts and Sciences

On January 7, 2015, terrorists attacked Parisian satirical magazine *Charlie Hebdo*, spurring worldwide panic and curiosity. The shooters were of Muslim background and were affiliated with the Boko Haram terrorist organization. The incident once again brought attention to the manner in which Western minority religions, specifically Islam, are depicted in the satirical press. As stipulated by France's secularism law, displays of any religious symbol, including, among other things, prayer, headscarves, and niqabs, are strictly prohibited in the public sphere. This law forms the backbone to the French constitutional principle of *laïcité*, which describes the absence of religious involvement in government affairs. The 1905 law was originally designed as an attempt at societal integration. But signs of reverse integration materialize as *laïcité* is now viewed as a form of suppression of religious freedom, specifically among religious minorities. With the recent terrorist attacks and modifications to *laïcité*, Muslim communities, in particular, are further marginalized. This research discusses the display of religious symbols in the infamous satirical newspaper *Charlie Hebdo*. If the weekly journal was obligated to the strict principles of *laïcité*, then *Charlie Hebdo* would be banned from publishing any depictions of religion. To investigate further, qualitative analyses of its weekly caricatures and timely releases from European media question the presence of moral injury. Considerable attention is designated to individuals who are marginalized by French society, specifically Muslims, due to increasing legal bans on faith-based practices in the public sphere.

How Does Resource Availability Affect Non-State Armed Group Recruitment?

Chelsea Thorpe, CURO Research Assistant
Dr. K. Chad Clay, International Affairs, School of Public and International Affairs

Ranging from the arid deserts of Sirte to miniscule Polynesian islands, many civilizations, whether or not they reside in conflict zones, have become prone to extremist attacks and violent resource extortion. In order for a terrorist group to successfully expand as an entity that imposes fear, both trustworthy financial and human capital are required to ensure organizational communication and global attention. Similar to a business or large corporation, non-state armed groups must have adequate resources to acquire and maintain covert supply chains through commerce and perhaps financial extortion. When recruiting and gathering resources, however, it is necessary to understand why, unlike a firm, non-state armed groups often use violence as a means of extraction. This answer requires an analysis of the decision-making behind various recruitment methods based on the structure, size, and objectives of each organization. This research uses qualitative and quantitative methods to analyze how geographical location, political regime structure, and technological availability affect the expansion of global terrorist organizations.

Plasticization of Nanocellulose Gel

Taylor Beth Timmons
Dr. Suraj Sharma, Textiles and Merchandising, College of Family and Consumer Sciences

Deriving from wood and cotton, cellulose is the most abundant organic polymer on Earth that is renewable, non-toxic, and biodegradable. Urges to use natural and biodegradable products aren't just coming from innovation, but out of necessity. Looking for alternatives and new research in a wide range of products eliminates ongoing issues and opens the field for future research. Using a high-pressure homogenization process with wood pulp slurry, cellulose is converted from a wood powder into nano-molecular gel. Thus, the

microfibrillated nanocellulose is modified to have plasticizing effects with the addition of the natural plasticizer, glycerin. Based on performance, optimal percentages of glycerin ranged from 10, 20, and 30%. For each of the glycerin plasticizer percentages, the hydrogel material was spin coated onto polyurethane and silicon films. The outcomes were characterized through water contact angle testing, a Scanning Electron Microscope (SEM), and biomedical tests. By adding a plasticizer, this allows for the cellulose based nano-composites to be used as coatings on catheter tubing to reduce biofilm formation. These biofilms cause infections through a buildup of bacteria in the tubing. Applying a thin coating of nanocellulose and glycerin plasticizer onto a catheter lead to reductions in biofilm formation. The adaption of cellulose turned a waste product into a non-toxic, biodegradable nanomaterial with biomedical applications.

Mapping Diverse Bicycling Experiences in Athens, GA

Sam Tingle, Foundation Fellow, CURO Research Assistant
Stephen Jordan
Dr. Jerry Shannon, Geography, Franklin College of Arts and Sciences

This study maps areas of Athens-Clarke County (ACC) that need bike infrastructure improvements while also providing a representative account of the diverse biking experiences of Athens, Georgia residents. 20-30 semi-structured interviews and cognitive mapping exercises will be conducted with bicyclists throughout the community. Narrative and GIS analysis will then be used to digitize and georeference these cycling experiences to produce geospatially accurate maps displaying pertinent data. ACC is lacking the comprehensive and representative data necessary to develop an equitable bike master plan. This study will assimilate quantitative and qualitative data representative of Athens' diverse biker subsets to better inform the ACC Bike Master Plan Committee.

The Effects of Type 1 Diabetes on Skeletal Muscle Endurance

Bethany Toney, CURO Research Assistant
Riley Jenkins
Dr. Kevin McCully, Kinesiology, College of Education

Type 1 diabetes (T1D) is an autoimmune disease affecting carbohydrate metabolism, which may alter muscle endurance. The effect of T1D on skeletal muscle endurance is currently unknown. The aim of this study was to measure muscle endurance in participants with a diagnosis of T1D and controls. The wrist-flexor muscles of participants with T1D (n=12) and controls (n=12) were electrically stimulated at frequencies of 2, 4, and 6 Hz for 3 minutes at each frequency. Muscle movement was measured with an accelerometer and analyzed with a custom MATLAB routine. Overall health of participants was assessed using an HbA1c test, casual glucose test, and adiposity measurements. T1D participants with an HbA1c of 7.3$\pm$0.8% were 20.8$\pm$2.2 years and had a BMI of 25.9$\pm$3.1. Controls with HbA1c of 5.2$\pm$0.4% were 20.8$\pm$0.4 years and had a BMI of 23.3$\pm$3.3. Adipose tissue measurements were 0.58$\pm$0.19 cm for T1D participants and 0.43$\pm$0.08 cm for controls. The endurance indexes were not different between T1D and controls ($P>0.05$ for all comparisons). Endurance indexes at 2, 4, and 6 Hz were 94.4$\pm$4%, 83$\pm$7.8%, and 69.5$\pm$14.8% for T1D and 95$\pm$3.9%, 87.6$\pm$6.2%, and 68.6$\pm$14.9% for controls. The hypothesis was not accepted that young people with well-controlled T1D had reduced muscle endurance compared to similar controls. Future studies could be performed on TID participants with moderate to poor control to determine the effect of blood glucose control on muscle endurance.

Emotional Modulation of the Late Positive Potential

Rebekah Trotti
Dr. Brett Clementz, Psychology, Franklin College of Arts and Sciences

The late positive potential (LPP) is an enhanced positive component of an event-related potential (ERP) elicited by emotional stimuli after 300ms. The LPP is sustained over the entire stimulus viewing window and continues after stimulus offset. This increased positivity reflects the allocation of neural resources to appetitive and defensive motivational stimuli. For this study, researchers used electroencephalography to record

ERPs while participants viewed unpleasant, pleasant, and neutral pictures from the International Affective Picture System. ERPs were elevated for unpleasant and pleasant stimuli from 500ms after stimulus onset to 250ms after stimulus offset at frontocentral and centroparietal scalp locations, indicating that the brain responds preferentially to emotional stimuli. Unpleasant and pleasant ERPs did not significantly differ, suggesting that the LPP is not valence-specific, but indicates processing of motivational picture content. Overall, these data demonstrate motivated attention in the brain.

Effects of Gender and Race on Speed and Accuracy of Facial Recognition

Skyler Tuholski, CURO Research Assistant
Samrina Jamal, Katie Lee, Nidhi Thiruppathi, Abby Thomas
Dr. Janet Frick, Psychology, Franklin College of Arts and Sciences

Gender and race of both viewer and target have been explored in the context of facial recognition accuracy, but factors predicting individual variability have not been as well investigated. Overall, women perform better than men in face recognition in terms of both accuracy and reaction time; women also display an own-sex advantage for recognition of female faces. In terms of race, it has been shown repeatedly that both males and females are better able to recognize faces of their own race when living in an area with a strong racial majority. In this study, we analyzed patterns of short term visual memory for both adult male and female Caucasian and Asian faces among male and female college-aged participants, using both accuracy and reaction time as measures of performance. We created a standardized experiment that contained a reaction time task and a short-term memory task, which consisted of blocks of white female, white male, Asian female, and Asian male faces presented in a random order. Preliminary data suggests that accuracy of both male and female participants is lessened, and reaction time is increased, when analyzing faces of another race. Additionally, our initial data supports our hypothesis that females show greater accuracy in recognizing female faces in either race condition, whereas males do not exhibit an own-sex advantage. These findings may have implications for understanding individual differences in factors underlying facial recognition and discrimination.

The Price We Pay: Analyzing the Over-Incarceration of Low-Level Juvenile Offenders in Georgia

Hannah Turner
Dr. Georgia B Calhoun, Counseling and Human Development Services, College of Education

This research explores the high rate of incarceration among low-level juvenile offenders in Georgia. Primarily, this work aims to answer what policy solution would effectively reduce incarceration rates while also befitting the juvenile offender and the public in general. Low-level offenders are youth who have committed minor crimes, yet face substantial damage to their future educational, employment, and mental health outcomes as a result of the time they are forced to spend in detention facilities. In addition, continuing to incarcerate children who arguably pose no threat to public safety costs taxpayers hundreds of thousands of dollars each year. A review of the literature revealed that many of these children are detained because there are few community-based sentencing options across the state that could mitigate the root causes of delinquency while keeping youth at home. To address this issue, I propose three different policy alternatives that each focus on increasing access to sentencing options within the community. The first would establish a state-wide grant program to fund mental health care for juvenile offenders, the second involves creating nonprofit networks to better serve youth doing community service, and the third requires each county in Georgia to adopt two community-based sentencing options. After considering the efficacy, feasibility, and cost-effectiveness of each alternative, the creation of nonprofit networks emerged as the best policy to reduce the number of low-level juvenile offenders currently incarcerated in Georgia.

Shedding Light: A Study of Light Pollution on the UGA Campus

Narissa Turner, CURO Research Assistant
Dr. Puneet Dwivedi, Forestry, Warnell School of Forestry and Natural Resources

Light pollution is the fastest growing pollution worldwide; however, many people are not aware of the adverse impacts of light pollution. Therefore, in this study I wish to identify the awareness level of UGA students about light pollution and attempt to determine the consequences of light pollution on the health of UGA students. I will also explore ways to reduce waste related to light pollution on the UGA campus. The data needed to successfully complete the first two objectives of the project will be collected using two different surveys. In the first survey, I will randomly survey 120 students in the Tate student plaza to determine their awareness level about light pollution. In the second survey, I will survey an additional 50 students living in UGA Housing to determine any adverse health impacts of light pollution. For the third objective, I will use the database maintained by UGA's Architect Office to define waste related to light pollution on the UGA campus. I hypothesize that the awareness level of students about light pollution will be low as the topic is very novel in nature. I also hypothesize that students living on campus may self-report several health-related issues which could be easily attributed to light pollution. Ultimately my goal for this project is to increase awareness about light pollution and to create opportunities for UGA to reduce waste related to light pollution.

Applicatives in Southern English

Nicholas Twiner, CURO Research Assistant
Dr. Vera Lee-Schoenfeld, Germanic and Slavic Studies, Franklin College of Arts and Sciences

This paper looks at three sentence types: Double Object Constructions (DOCs); Benefactive Constructions; and Subject Co-Referential (SCR) applicatives, demonstrated as follows: John gave Mary the book; John baked Mary the cake; and John caught him a fish. DOCs must have two objects following the verb. Benefactives and SCRs have optional objects (John baked a cake) which are introduced to sentences by silent components which compound with the verb. I seek to clarify the case assignments in these sentences. Every noun needs case; otherwise, the sentence will not satisfy the requirements for an acceptable sentence. There are two types of case: structural and nonstructural. Structural case is assigned to the subject, nominative, and to one object, accusative. Another silent verbal component called Active Voice assigns accusative. Accusative is not assigned in passive sentences because it lacks Active Voice. This diagnostic shows if cases are structural. Nonstructural cases are assigned via unique verbs or because of objects' roles in the sentence. The questions then remain: what assigns case to the direct object in the three sentences; and, for verbs like bake, which do not need an indirect object, what accounts for the alternation in case? Sometimes the direct object is structurally marked (The cake was baked), but sometimes the indirect object is structurally marked (Mary was baked a cake). I argue these constructions rely on nonstructural case. For DOCs, case is assigned by DOC verbs. For benefactives and SCRs, the functional component provides this case.

An Investigation of RIN4 Phosphorylation in Plant Immunity

Elizabeth Umanah
Dr. Marianne Shockley, Entomology, College of Agricultural and Environmental Sciences

RPM-Interacting Protein 4 (RIN4) is an essential regulator of plant defense in the model *Arabidopsis* - *Pseudomonas* pathosystem. This protein performs its role by activating both effector- and pathogen-associated molecular patterns (PAMP)-triggered immunity (ETI and PTI) by being phosphorylated. Current work in our lab has identified two kinases that interact with RIN4. The research being conducted seeks to understand the mechanisms behind the interaction of each kinase with RIN4 by examining if phosphorylation will occur at specific residues on the protein. It was hypothesized that elimination of RIN4 phosphorylation will inactivate its immune signaling function, rendering plants susceptible to pathogen infection. The research will be conducted by first performing an in-vitro kinase assay. Then, to elucidate the role of RIN4 phosphorylation, we will assess the presence of the hypersensitive response (HR) by co-infiltrating a bacterial effector and RIN4 phosphomimetic proteins into the plant *Nicotiana benthamiana*. The results of the experiment will allow us to understand how these two kinases interact with RIN4 to elicit the plant's defensive functions against an infection. With the knowledge from the results, the mechanism behind RIN4's plant

immune regulation and the protein's significance during the regulation will be determined.

The Ciliary Gliding Motility in Eukaryotes

Rachel Vaizer
Dr. Mark Farmer, Cellular Biology, Franklin College of Arts and Sciences

The ability of cells to move through their environment is one of the most ancient attributes of living cells. One way in which cells can move is through ciliary gliding, which is thought to be both ancient and highly conserved, even among human cells. Developing an understanding of the mechanism of ciliary gliding in Euglenid flagellates may help us understand this basic mechanism in other cells. This study is designed to determine the relative positions of two ciliary structures, the paraxial rod (PAR) and axoneme, relative to a substrate. The Euglenid cilium has an asymmetrical formation of the paraxial rod, a lattice-like fiber that extends the length of the cilium, and the axoneme, which has a 9+2 arrangement of microtubules. This unique formation allows us to study the potential orientation of the cilium relative to a substrate while an organism is gliding. To find which axonemal microtubular doublets are associated with the motive force responsible for pushing and pulling the cell, specimens will be prepared for and examined using transmission electron microscopy. This will enable us to determine the relative positions of ciliary structures relative to a substrate.

Understanding the Role of Social Determinants in Drug Overdose Deaths in Georgia

Christina Valentini
Dr. Jayani Jayawardhana, Clinical and Administrative Pharmacy, College of Pharmacy

Georgia has experienced an exponential increase in drug overdose deaths. Specifically, the number of deaths due to opioids and heroin has increased dramatically in Georgia within the last decade. However, the impact of social determinants on disparities in drug overdose deaths is not clear. Certain demographic groups could be adversely affected by this public health epidemic. While many studies have explored national trends of drug overdoses, few have specifically considered the epidemic in Georgia. This research examines the impact of social determinants on drug overdose deaths in Georgia. We use county-level drug overdose death data from the Georgia Department of Public Health's Online Analytical Statistical Information System (OASIS) for the analysis. Additional data on population demographics, poverty level, median household income, and geographical variation (rural/non-rural) are gathered from the US Census Bureau. Analysis data sample includes 2,703 observations from all 159 counties in Georgia from 1999-2015. Both descriptive analyses and regression analyses will be conducted to determine the role of social factors on drug overdose deaths in Georgia due to all drugs, opioids, and heroin. The results of this study will highlight the variations in drug overdose deaths across multiple social determinants in the state. The findings will help identify public health policy interventions that address the social determinants that are contributing to this public health priority in Georgia.

Investigating the Grindability of Woodchips at Varying Torrefaction Temperatures

Ian E Van Giesen, CURO Research Assistant
Dr. Sudhagar Mani, Chemical, Materials, and Biomedical Engineering, College of Engineering

Torrefied woody biomass, a promising alternative to coal, has great potential to be used in co-firing coal applications, however, a rigorous analysis of the energy required to grind the torrefied material is needed determine the economic feasibility of the alternative fuel. This study investigated the grindability of woodchips torrefied at four different torrefaction temperatures. Higher torrefaction temperatures increased heating values, but decreased the woodchips' durability. Lower durability woodchips require less energy to be ground, but are susceptible to deterioration and subsequent loss of material during transportation. The obtained results will be beneficial for producing a fuel whose characteristics are most similar to coal.

Adapting a CRISPR-Cas System into a Novel Gene Knockdown Platform

Nikita Vantsev, CURO Honors Scholar, CURO

Research Assistant, CURO Summer Fellow
Dr. Michael Terns, Biochemistry and Molecular Biology, Franklin College of Arts and Sciences

CRISPR-Cas adaptive immune systems of prokaryotes consist of a CRISPR locus containing an array of invader-derived sequences called spacers, separated by repeat sequences, and CRISPR-associated proteins. These systems function in three mechanistically distinct stages. First, there is an integration of spacers into the CRISPR array of the host genome to generate a heritable record of the invasion. Second, the CRISPR array is transcribed and processed into several guiding CRISPR RNAs (crRNAs) that each match a different invader sequence. Finally, the crRNAs are incorporated into a complex with Cas proteins and guide this crRNA-Cas protein complex in silencing invaders via cleavage and destruction of the foreign complementary nucleic acid. My research project focuses on utilizing the invader silencing complex of Type III-A CRISPR-Cas systems to design efficient gene expression suppression tools. In vivo expression experiments of the full and reduced complexes in *E. coli* bacteria coupled with Northern Blot analysis demonstrated that Type III-A CRISPR-Cas complex was capable of efficient RNA cleavage.

Association between Ankle Sprain History and Current Ankle Sprains in Collegiate Club Sports Players

Alyssa Varsalona
Dr. Cathleen Brown Crowell, Kinesiology, College of Education

Research suggests that ankle sprains are the most common sports-related injury, and players with a history of ankle sprains are likely to sustain recurrent ankle injuries. The purpose of this study was to determine if an association between previous ankle sprain history and current ankle sprains exists among a population of collegiate club rugby and ultimate Frisbee players. Participants self-reported previous injury history prior to the competitive season and submitted weekly surveys to document practice time and injuries that occurred during the previous week. University of Georgia's club rugby and ultimate frisbee players who had sustained any injury during the 2015-2016 school year were included in the analysis (n=30; 15 male, 15 female; age=20.6±1.7yrs, height=172.5±9.0cm, weight=75.0±17.4kg). Association between ankle sprain history and current season ankle sprain was computed using a Phi coefficient. Of the 30 participants, 12 (40%) reported having sustained an ankle sprain in the past, while 8 (26.7%) reported a current season ankle sprain. A statistically significant weak-to-moderate positive association was observed between ankle sprain history and current season ankle sprains (Φ=0.59, p=0.001). The strength of the association was likely a result of the small sample size. Confounding variables may exist, although they were not accounted for in this analysis. Based on the data obtained, we can conclude a weak-to-moderate positive association between the two variables is present, but cannot determine causality of the recurrent ankle sprains. Further research is necessary to conclude ankle sprain history is directly predicative of recurrent ankle sprains.

Structural Insights into the Role of [2Fe-2S] Clusters in Bacterial Ferrochelatases

Sheena Vasquez, CURO Research Assistant
Dr. Harry Dailey, Microbiology, Franklin College of Arts and Sciences

Heme is an essential cofactor of various enzymes in organisms. It is a key compound for several biological functions such as drug and hormone metabolism and oxygen transport throughout the cell. When the biosynthesis of heme is disrupted, the buildup of its precursors has been shown to cause genetic diseases known as porphyrias. Ferrochelatase is the terminal enzyme in the heme biosynthetic pathway that inserts ferrous iron into the porphyrin ring to make the complete protoheme compound. Human ferrochelatases are known to contain an [2Fe-2S] cluster; however recent studies have shown that bacterial ferrochelatases contain this cluster, as well. In addition, there are at least three different motifs hypothesized to coordinate the iron-sulfur cluster in these enzymes. The reason for mammalian and bacterial ferrochelatases containing this cluster is unknown. Therefore, the goal of this project is to provide structural evidence for how the [2Fe-2S] clusters are coordinated by the various motifs in these enzymes. Ferrochelatases from *Ruegeria pomeroyi*, *Myxococcus xanthus*, and *Caulobacter crescentus* were used for investigations.

Furthermore, techniques such as protein purification and crystallography were used. Initial crystal conditions were obtained for the ferrochelatases, and optimization experiments under these conditions are being actively conducted to produce high quality crystals for X-ray diffraction. These findings will provide insight into the coordination and purpose of the [2Fe-2S] clusters in bacterial ferrochelatases.

The Effect of Insulin Dysregulation and Breed on HPA Axis Function and Plasma Cortisol Binding Dynamics in Ponies and Horses

Sarah Vaughn
Dr. Kelsey Hart, Large Animal Medicine and Surgery, College of Veterinary Medicine

Mechanisms resulting in breed predispositions to insulin dysregulation (ID) and endocrinopathic laminitis are poorly characterized. The adrenal steroid cortisol antagonizes insulin, and free, biologically active cortisol can be increased in ID. Breed-related differences in serum free cortisol fraction (FCF) could contribute to ID in pre-disposed breeds such as ponies, but FCF has not been quantified in ID-predisposed-breeds. The objective of this study was to compare FCF between horses and ponies during health and ID. We hypothesized that: in health, FCF is higher in ponies than horses; and FCF is further increased in ponies with ID. Serum total cortisol (TC), ACTH, FCF and insulin were measured in 36 horses (age 1-24 years) and 31 mixed-breed ponies (age 4-27 years). Animals were sampled before morning feeding in their normal routine, and ID was defined as fasted insulin > 20 μIU/ml or non-fasted insulin > 60 μIU/ml when sampled on pasture. Data were compared with Mann-Whitney tests and Spearman correlation analysis ($P<0.05$). TC and FCF were comparable in healthy horses and ponies, but ACTH and insulin concentrations were 1.3-1.6-fold higher in ponies ($P=0.001$-0.041). In animals with ID, TC was similar but FCF and insulin were increased 1.6-fold and 3.2-fold respectively in ponies ($n=9$) compared to horses ($n=11$, $P=0.01$-0.049), and FCF and insulin were positively correlated ($P=0.04$, $r=0.45$, 95%C.I=0.014-0.746). These data demonstrate differences in hypothalamic-pituitary-adrenal axis function during health and ID between ponies and horses. Further study is needed to determine if and how such alterations impact insulin regulation and, ultimately, laminitis risk.

Computational Investigations of He-HD Collisions in the Interstellar Medium

Clark Goodman Veazey, CURO Research Assistant
Dr. Phillip C Stancil, Physics and Astronomy, Franklin College of Arts and Sciences

When conducting an examination of distant astronomical objects, scientists rely on measurements derived from astronomical observations of these objects, primarily using spectroscopy. The most obviously available data is in the form of radiation being transmitted to us from the source at the speed of light. Ideally we can interpret these incoming photons, which are emitted by charged molecules interacting throughout the interstellar medium, to generate accurate data detailing the way that these molecules are behaving, giving astronomers insight into the temperature and therein the energy of the source object. Seeing as most of the observable infrared radiation in the universe is emitted by molecules excited by collisional processes in the interstellar gas, generating accurate data on the rate of molecular collisions is of salient interest to astronomical endeavors. The collisional system we will be focusing on here is He-HD, an atom-diatom system in which He (Helium) collides with HD (Deuterium-Hydride). We are primarily interested in the cooling capabilities of this system, as these species are predicted to have played an important role in the formation of primordial stars, which emerged from a background composed solely of Hydrogen, Helium, and their compounds. Using an adaption of a public-domain scattering package known as molscat, cross-sectional areas of He-HD collisions are computed for a swathe of rotational and vibrational states across a range of relevant kinetic energies, then integrated to produce rate coefficients. In this research, the resources being utilized are the UGA GACRC z-cluster, and the Cray-XC/40a 30 peta-flop machine at NERSC.

Reducing and Preventing Sexual Assaults on Georgia College Campuses

Eashaa Velamuri

Dr. Chris Linder, Counseling and Human Development Services, College of Education

This policy research looks at the prevalence of sexual assault on college campuses within the University System of Georgia. It questions what is being done to combat sexual assault on these campuses and what could be done. This research goes on to develop policies to reduce and prevent the number of incidences of sexual assault at these Georgia schools. Through a literature review, some common themes were found as to why sexual assault occurs on college campuses and the effects of these sexual assaults on the victims of the attacks. Specifically, past research has shown that much of the problem stems from a lack of transparency within sexual misconduct policies and sexual health and violence prevention education. In addition, the short history of sexual assault policy and long history of "rape culture" on college campuses allows for more sexual violence perpetration. To address these issues, I created three policy alternatives, which include: amendments to the Sexual Misconduct Policy developed by the Board of Regents, introduction of a course on sexual violence prevention in 8th and/or 9th grade, and the creation of more consistency within the Clery Act. After comparing the different policy alternatives against the status quo and measuring the effectiveness, cost and benefits, and feasibility of each, I determined that the best policy alternative is to amend the current Sexual Misconduct Policy as it directly affects how sexual misconduct cases on college campuses are dealt with and thus would have the most immediate impact on victims of sexual assault.

Influence of Air Pollution and Socioeconomic Factors on Chronic Obstructive Pulmonary Disease (COPD)

Siva Venkatachalam, CURO Research Assistant
Dr. John L Gittleman, Ecology, Odum School of Ecology

The World Health Organization predicts COPD to be third leading cause of death worldwide by 2030. Therefore, it is important to find out the factors affecting the spread of COPD. This project focuses on how complex patterns of air pollution, disease mortality of COPD, and socioeconomic factors (GDP per capita/number of physicians) are related to one another. Using statistical analysis, I have depicted the correlation between each variable from the database and identified potential factors underlying their relationship. I used a statistical software (.JMP, regression, and PATH analysis), WorldBank data, and predictions from literature to identify if pollution levels correlate to a higher COPD mortality rate while socioeconomic factors make a negative impact on the spread of COPD. There was a significant, positive correlation between pollution levels (CO_2 emission) and COPD mortality rates. There was an even stronger positive correlation between GDP per capita and the rise in pollution. A potential explanation for this is that mainly urban cities with high GDP and population density often have higher pollutant levels (ex: Beijing, Mumbai, NYC) causing a positive relationship between pollution and per capita. Interestingly, there was even a stronger negative correlation between COPD mortality rates and GDP. Countries with higher GDP levels have a better quality of healthcare (higher number of physicians) which allow for less mortality rates in COPD. In conclusion, the medical community should target different types of air pollutants to prevent the spread of COPD and study COPD causes on a local level.

Visualization of Lung Inflammation

Mayank Verma, CURO Research Assistant
Dr. Ramana Pidaparti, Environmental, Civil, Agricultural, and Mechanical Engineering, College of Engineering

The stochastic nature of cells makes it difficult to understand how certain pulmonary diseases such as asthma cause inflammation within the bronchial tubes. Since in vivo analysis is a challenging task, simulation-based modeling is fruitful in many cases in understanding the processes occurring at the cellular level. Cellular Automata (CA) based simulations offer a powerful solution to this problem by giving mathematical identities in the form of rules to these complex biological systems. These rules provide a medium to better understand how certain parameters such as; normalized thickness, normalized air pressure, Young's Modulus, and frequency of the breathing cycle affect the rate of inflammation on the lung tissue. In this study, we will develop rules and simulation frameworks in Java with a touch of

virtual reality to visualize the inflammation process and to acquire its corresponding metrics. Our preliminary sample tests suggest that varying the parameters plays a critical role on inflammation. We plan to extend this work toward a more robust CA simulation framework for various other diseases and inflammation simulations.

An Insight into Organizational Use of Business Process Management Tools and Technologies: An Exploratory Examination

Will Russell Vineyard, CURO Research Assistant
Dr. Dave Chatterjee, Management Information Systems, Terry College of Business

Business Process Management (BPM) is an interdisciplinary systematic approach to creating more effective and efficient workflows to support and empower operational and decision making activities. By employing various tools, techniques, and methodologies, BPM practitioners enable organizational decision makers to see past irrelevant complexities inherent to organizational clutter. This not only allows management to make decisions in a timely and well-reasoned manner, but provides them with a clear and direct way to communicate these decisions to their underlings. BPM practices are universally highly regarded and employed by large corporate firms, but they should not stop there. Through interviewing subject matter experts and reviewing a wide-variety of BPM literature and research, I have come across ways in which organizations in which BPM is not traditionally used stand to reap great benefits if they start engaging in BPM activities. My exploratory findings suggest that organizations of all sizes and purposes stand to benefit from integrating some degree of BPM to their operations, be they a Fortune 500 company or a ten-person non-profit. By doing so, not only will these organizations discover ways in which they can operate more efficiently and effectively, but they also might even provide new insights for BPM in the corporate world.

A Phylogenetic Analysis of *Pyractomena* Fireflies

Garrett Vollino
Dr. Kathrin F Stanger-Hall, Plant Biology, Franklin College of Arts and Sciences

Firefly species around the globe are known for emitting a wide variety of light colors; however the North American genus of *Pyractomena* displays the largest variation ranging from green to orange. In addition, very little is known about their evolutionary history or what factors determine the different distributions of the 16 *Pyractomena* species across North America. Using DNA extracted from 1-3 legs of individual firefly specimen this research study will generate the first *Pyractomena* phylogeny for 10 species with DNA grade specimen (based on three separate protein coding genes: mitochondrial COI and two nuclear genes WG and CAD). This phylogeny will be utilized with biogeographical data for a phylogeny-based analysis of biodiversity and for testing of evolutionary hypotheses on signal evolution in *Pyractomena* fireflies.

Exploiting CRISPR/Cas Genome Editing System in Ciliogenesis

Catherine Waldron, CURO Research Assistant
Dr. Jonathan Eggenschwiler, Genetics, Franklin College of Arts and Sciences

Dysfunction in ciliary processes can lead to a wide range of ciliopathies, which can be further studied and corrected for medical purposes. The overall goal is to study the regulation of ciliogenesis through investigation of proteins that are known to have a role that is not yet understood. The ciliary proteins we are investigating include intraflagellar transport (IFT) proteins, motors, and regulatory proteins that play a part in regulating the primary cilia. The specific genes of interest are Atat1, Kif7, CCRK, IFT122, and Bbs8. To investigate the roles of these genes, we used the CRISPR/Cas genome editing system and a Cre-LoxStopLox (LSL) transcriptional cassette to induce reversible mutations in the target genes. Generation and insertion of the LSL/Homology cassette into the mIMCD IFT88YFP cell line was successful. This will lead to further phenotypic analysis at the mechanistic level by observing the effects on the ability and rate of intraflagellar transport within the overall structure of the cilia.

Mapping and Modeling Hotspots of Schistosomiasis

Joseph Walker
Dr. John M Drake, Ecology, Odum School of Ecology

Schistosomiasis is a water-borne parasitic disease caused by flatworms of the genus *Schistosoma*. These parasites infect over 200 million people each year, mostly children living in rural Africa. Although Schistosomiasis is usually not lethal, chronic infection can stunt physical and cognitive development and hinder productivity at school and work. In 2010, the Schistosomiasis Consortium for Operational Research and Evaluation (SCORE) began conducting longitudinal studies in Tanzania, Niger, Kenya and Mozambique on the efficacy of Mass Drug Administration (MDA) for controlling the parasite. Investigators observed that some "responder" villages were able to significantly reduce the prevalence of Schistosomiasis by the end of the study period, while other "hotspot" villages experienced comparatively little change in prevalence. The goal of our work was to identify which factors influence the change in Schistosomiasis prevalence among Mozambique study villages. To accomplish this, we trained boosted regression trees on environmental and survey data associated with 120 of the 150 SCORE study villages in Mozambique. We then applied the resulting model to the remaining 30 villages in order to evaluate our prediction ability. Although our model was relatively successful at explaining the change in prevalence for the training villages (Pearson R^2 of 0.69), we were unable to make accurate predictions on the withheld test villages (Pearson R^2 of 0.03). In addition to our modeling work, we have created maps of all SCORE study villages in Tanzania, Kenya, Niger, Mozambique and Côte d'Ivoire.

Comparison of Female and Male Lone Star Tick Microbiomes in Watkinsville, Georgia

Lily Victoria Lee Wang
Dr. Travis Glenn, Environmental Health Science, College of Public Health

Ticks are vectors of many different diseases; however, we currently lack details of where, when, and how these diseases are distributed among ticks. By studying the population structure of tick microbial communities, we may be able to track the spread of pathogens by ticks and have a better idea of which pathogenic bacteria are able to co-infect ticks and at what proportions. I characterized the microbiomes of three sets of female and three sets of male lone star ticks collected on different dates from the same location near Athens, Georgia. I extracted DNA from 70 ticks, amplified 16S rDNA, which is specific to bacteria, and obtained an average of 12550 sequences per tick. I then searched for matching 16S sequences from a database of most known 16S sequences and putatively detected *Coxiella*, *Rickettsia*, and *Ehrlichia*. I tested for differences in the prevalence of these pathogens among each set of ticks. The results show that female lone star ticks had a significantly higher proportion of *Coxiella* in their microbial community than male lone star ticks ($p < 0.01$), leading us to conclude that female lone star tick microbiomes are significantly different from those of their male counterparts. Although additional studies characterizing more ticks are necessary to confirm my findings, this study provides a foundation for future studies relating to the population structure of pathogens in lone star ticks.

Identification of Vaccine Misinformation Online

Jonathan Waring, CURO Research Assistant
Prof. Shannon Quinn, Computer Science, Franklin College of Arts and Sciences

Vaccination provides the most effective method of preventing infectious diseases. While vaccine safety and efficacy has been widely studied and verified, there is still opposition from the anti-vaccine movement. It has led to vaccine hesitancy, which is defined as a delay in acceptance or a refusal of vaccine services. It is an ever-growing and constantly changing problem that needs constant surveillance. The internet plays a large role in disseminating vaccine misinformation to a large number of people, which contributes to the vaccine hesitancy problem. In order to combat the spread of misinformation online, it is important to first recognize true facts from false ones. We attempt to develop a machine learning strategy using natural language processing (NLP) that allows one to identify misinformation in vaccine-

related webpages. This will be accomplished through the use of the low-dimensional document embedding algorithm, Doc2Vec. Through the use of semi-supervised learning, we take a small sample of manually labeled vaccine webpages and a large amount of unlabeled vaccine webpages, and attempt to classify misinformed webpages from accurate ones. Doc2Vec also provides methods for determining how semantically similar two documents may be, which can be used to determine what makes a vaccine webpage misinformed. The results of this study could enable both public health practitioners and the general public to monitor vaccine misinformation online in order to reduce vaccine hesitancy and identify strategies to improve vaccine education.

The Expression of the Duffy Antigen Receptor for Chemokines in the Triple Negative Breast Cancer Cell Line, HHC1806

Lauren Taylor Wassel
Dr. Melissa B Davis, Genetics, Franklin College of Arts and Sciences

The Duffy Antigen Receptor for Chemokines (DARC), also known as Duffy or ACKR1, is a seven transmembrane atypical chemokine receptor present on a variety of cell types in the human body. DARC is considered an atypical receptor for two reasons. First, rather than being a signaling receptor, DARC acts as a chemokine sink to reduce the concentration of chemokines in circulation, indirectly influencing the migration of immune cells. Second, DARC is able to bind more than twenty different chemokines in two distinct structural classes, CC- and CXC-, which allows for its description as a promiscuous chemokine receptor. DARC has two distinct protein isoforms that are expressed differentially. This study follows isoform B, which differs from isoform A in the first 7 amino acids at the N-terminus of the protein, making up part of the extracellular binding region. Isoform B was overexpressed through transient transfection in the triple negative breast cancer (TNBC) cell line, HCC1806, to detect differential chemokine binding between the two structural classes. Overexpression was quantified using qPCR, and co-localization with chemokines from the two classes was completed with immunofluorescence imaging of DARC with CCL2 or CXCL8, two known ligands. Future studies will look at the binding affinities of these two chemokines to the different isoforms of DARC, in addition to investigating these interactions in cell lines representing other molecular subtypes of breast cancer.

Derivation of Aerosol Optical Depth and Total Column Ozone via DOBSUN Instrument

Nicholas D Weinand, CURO Research Assistant
Dr. Geoffrey D Smith, Chemistry, Franklin College of Arts and Sciences

Currently, most atmospheric components are measured using expensive, stationary or satellite-based instruments, limiting when and where valuable measurements, potentially elucidating changing climate conditions, can be made. Utilizing an Arduino microprocessor, an RGB color sensor, two UV analog sensors, and various pairs of UV-range band-pass filters, the DOBSUN instrument was designed to easily and inexpensively calculate aerosol optical depth (AOD) over three wavelengths of light, and derive total column ozone (TCO), both important measures of differing atmospheric components. Calculated AOD values were compared to NASA AERONET calculations, with previous measurements producing an average difference of 28% for the red wavelength (612nm), 34% for green (542nm), and 28% for blue (468nm). The DOBSUN calculated TCO values, derived from measuring the differing intensity of UV radiation at two different wavelengths, were compared to NOAA Brewer instruments, and differed on average by roughly 300%. Current efforts are being made to design an instrument case that would allow for a more standardized data retrieval method, theoretically increasing the accuracy of extrapolated factors used to calculate AOD and TCO. For additional comparison with theoretically accurate instruments, DOBSUN AOD measurements are being compared to those made by the Sun and Sky Monitoring Station, an established, inexpensive, sun photometer. Further development of the DOBSUN instrument could allow for its introduction into nearby middle or high school classrooms, as a means of introducing atmospheric science to younger students, while

producing accurate and valuable atmospheric data at a variety of locations.

Needs Assessment to Assess the Use of a Mobile Food Pantry in the Child Care Setting

Camaria Moné Welch, CURO Research Assistant
Dr. Caree Jackson Cotwright, Foods and Nutrition, College of Family and Consumer Sciences

Childhood obesity is a major public health concern. The objective of this study is to conduct a needs assessment to determine if a mobile food pantry and nutrition education intervention will increase fruit and vegetable (FV) consumption and self-efficacy to cook healthy meals. The target audience is early care and education (ECE) stakeholders, parents, and teachers serving low-income children in Northeast Georgia. The needs assessment methodology will include quantitative baseline data collection via surveys related to cooking self-efficacy and attitudes, FV consumption, and an inventory of FV served in the home. Barriers and facilitators to the use of mobile food pantry will be collected using qualitative methods including, key informant interviews, focus groups, and Photovoice. Surveys will be administered to participants in an existing mobile school food pantry with the Food Bank of Northeast Georgia and local ECE stakeholders. Focus groups and interviews will be conducted with ECE center directors, Food Bank managers, ECE teachers, and parents. Photovoice, an approach that combines photography and social action, will be implemented by families to assess their nutrition knowledge, food environment, and overall perception of the use of a mobile food pantry. It is expected that the target audience will have low baseline self-efficacy for consuming and preparing FV. We also expect to gain salient data on planning an intervention to increase knowledge and self-efficacy using a mobile food pantry. This study is significant because it adds to the dearth of knowledge about how to increase access to and preparation of healthy foods for low-income families.

The Sapelo Island Coloring Book

Abigail Elizabeth West, Foundation Fellow
Dr. Chris Joseph, Anthropology, Franklin College of Arts and Sciences

Sapelo Island is home to the only remaining intact Geechee community in Georgia. They are the direct descendants of slaves who bought and settled the land after the Civil War, and while they have managed to maintain much of their cultural heritage, the Hog Hammock community is threatened by loss of land, lack of employment, and an aging population. This research addresses the question: can art be used as a way to draw attention to their struggle to maintain a community on Sapelo? *The Sapelo Island Coloring Book* documents this unique island as it exists today, as seen through the eyes of the artist. While many artists have drawn and painted Sapelo's natural beauty, this book takes a more holistic perspective of what forms a place's identity, depicting places of cultural, historical, and environmental significance. Anyone who colors these pictures is encouraged to think about their narratives and to learn more about Sapelo and the Hog Hammock community. The artist used research methods including spending time exploring the island, observational drawing, renting a room and being immersed in Hog Hammock, chatting with locals, and reading. The coloring books have been well-received by both members of the Hog Hammock community and the public: as of February 2017, over 200 books had been sold. They are being sold in stores on and near Sapelo, in Athens, and online. All proceeds are being sent to the Sapelo Island Cultural and Revitalization Society, whose mission is to preserve and revitalize the Hog Hammock community.

Utilization of Organic Synthesis to Investigate Molecular Organic Frameworks

Aubrey Wheeler, CURO Research Assistant
Dr. Douglas M Jackson, Chemistry, Franklin College of Arts and Sciences

Metal Organic Frameworks, or MOFs, are hybrid 3-dimensional structures consisting of transition metal atoms linked via organic ligands. These compounds are porous and have applications in catalysis, molecular recognition, and separation. This work seeks to develop a metal-organic

framework in an array biocompatible zinc atoms that would connect a set of switchable organic linkers. Molecular switches are molecules which respond to an external stimulus by changing reactivity or configuration. The target molecular switch will be altered by changes in pH and/or ultraviolet light. Synthetic targets for this MOF will require a functional aromatic macrocycle that moves back and forth in a mechanical movement in response to an external stimulus thus altering the function of the structure. Potential applications include drug delivery, for example a drug may be encased in the overall structure, which could then be released only in certain target tissues without harming normal somatic cells. Current work for development of this molecular machine includes a novel synthesis of a mechanically interlocked macrocycle, rod-shaped backbone, and an endcap or stopper for containment along the backbone.

Effects of Pre-Transition Warnings and Contingency Statements on Compliance to Pre-Transition Demands and Problem Behavior

Allison N White, CURO Research Assistant
Dr. Kevin M Ayres, Communication Sciences and Special Education, College of Education

Research suggests that pre-transition verbal warnings alone are not a sufficient intervention in order to decrease latency to comply with transition demand and decrease problem behavior associated with transitions. The current study used an alternating treatment design embedded in a multiple baseline across types of transitions to evaluate effects of different verbal warnings and contingency statements on the latency to comply with demands and problem behavior during transitions. The researchers examined the effects of intervention on 4 elementary-aged students in their self-contained special education classrooms. Researchers collected data on students' latency to comply with transition demands and student-specific problem behavior. The anticipated effects of intervention are a decrease in latency to comply with transition demands and a decrease in problem behavior associated with transitions. The current study provides an evaluation of an easy to use but understudied pre-intervention study.

Hydroxyl Tracing in Diffuse Molecular Clouds

Josh S White
Dr. Loris Magnani, Physics and Astronomy, Franklin College of Arts and Sciences

In an attempt to determine the extent of "dark molecular gas" in the Galaxy, we have conducted a survey of hydroxyl (OH) in a region containing a low-density molecular cloud. Dark molecular gas is a term given to regions which contain H_2, but may not be detectable with radio spectroscopic tracers. We also seek to determine the overall efficacy of hydroxyl as an indicator of the presence of molecular hydrogen. We observed spectral lines of OH at multiple locations (491 individual pointings in 44 locations) on a grid in a region of the sky where molecular hydrogen had previously been detected. Our data were taken with the 305-m Arecibo radio telescope in Puerto Rico. The spectra were then each analyzed for the presence of OH emission lines. The results of this study should determine the extent of "dark molecular gas" in this region and perhaps be applicable to other regions with low-density molecular clouds. We also aim to determine conclusively whether OH is a better tracer of dark gas than the most common molecular tracer, carbon dioxide.

Two Dimensional Visualization of Higher-Order Relations in Biological Graphs

Matthew Wicker, CURO Research Assistant
Dr. Liming Cai, Computer Science, Franklin College of Arts and Sciences

Data visualization is a powerful tool in scientific investigations. It makes it possible to perceive significance and identify correlations or causalities across a complex system under investigation. While often such relations of data are modeled with graphs, it is quite challenging for a visualization tool to faithfully visualize the higher-order, crossing relations in a graph on a two dimensional medium. In particular, recent research at the UGA RNA Informatics lab has developed a graph model (k-tree) for RNA secondary and tertiary structure, enabling computational prediction of sophisticated nucleotide interactions. The work motivated our research to seek a visual abstraction method for the k-tree that captures

nucleotide interactions in order to evaluate and improve RNA nucleotide interaction prediction before rendering a 3D structure. The objective of our visualization research is to display the data such that we achieve: even distribution in the drawing space, minimal edge crossing, and preservation of any symmetry that exist in the data. After observing the effects of different graphing schemes on k-trees, we have found that force directed algorithms produce the most meaningful abstractions. Initial results in this direction have been encouraging. The use of a constrained Kamada-Kawai algorithm on known RNA tertiary structure allows an accurately represent biological structures. Further constraining this model and expanding into three dimensions should allow abstraction of significant information about RNA molecules based on the k-tree.

Online Activism: The Movement to Combat Honor-Based Violence

Ashley Willard, Foundation Fellow
Dr. Mark Cooney, Sociology, Franklin College of Arts and Sciences

Honor-based violence (HBV), a form of communal sanctioning used to restore familial honor following a perceived transgression, has existed in various male-dominated societies over the course of human history. In 2000, the United Nations estimated the prevalence of honor killings, the most extreme form of HBV, to be 5,000 deaths per year. This number is widely considered to underestimate the true prevalence, as the collective nature of the phenomenon facilitates the concealment of murders as suicides or natural deaths. The regions most affected by HBV are Southeastern Asia and the Middle East. Relatively recently, these practices have spread to the English-speaking world through immigration. A social movement has arisen in response. My research focuses on the development of this movement in the Western world. In a bid to assess the status of the Western anti-HBV movement, I conducted a search of organizations with an English language online presence (n=30, to date). I gathered and coded information on their missions, particularly the division into groups providing direct services to victims and those focusing on disseminating information, their social network involvement, their regional distribution, and the timeline and evolution of the social movement more generally. This research contributes to the sociology of social movements by consolidating fragmented resources and thereby providing an overview of concurrent cross-national activism in response to HBV.

Small Structures in the Magellanic Stream: Cloud-Cloud Interactions

Elliott Williams, CURO Research Assistant
Dr. Robin Shelton, Physics and Astronomy, Franklin College of Arts and Sciences

Our Solar System lies in one galaxy, the Milky Way (MW), surrounded by neighboring galaxies. Two of these neighboring galaxies, named the Large and Small Magellanic Clouds (LMC and SMC, respectively), have been caught in our gravitational field and are currently orbiting around the MW. As the LMC and SMC travel around the MW, gas is stripped from them and trails behind. The Magellanic Stream (MS) is a structure of mostly neutral and ionized hydrogen gas pulled from the LMC and SMC. It stretches ~100° along the southern polar axis relative to the MW. It is estimated to contribute ~0.4 solar masses of material to the MW per year via diffuse warm gas raining on the halo that has been decelerated enough to fall in. This study investigates the mechanics of small structures in the MS, specifically in dual cloud scenarios, through hydrodynamical simulations. Our simulations look at two clouds at varying distances, one directly downstream from the other, as well as a single cloud simulation, to understand how cloud-cloud interactions affect different processes such as gas infall rate and cloud survival. We will present the physical state of the gas from the clouds including its density and temperature in regions of cloud-cloud interactions. Using results from this study, we hope to aid observations by providing certain identifying characteristics of processes in the MS to better understand the evolution and future of the MS.

Investigating the Function of GABAergic Signaling during Neural Development of Zebrafish

Sydney Williams

Dr. James D Lauderdale, Cellular Biology, Franklin College of Arts and Sciences

Γ-Aminobutyric Acid (GABA) is known to be the primary inhibitory neurotransmitter in the adult vertebrate central nervous system. An imbalance of excitatory and inhibitory neurotransmitters can lead to seizure activity in the brain. Glutamate is converted to GABA via the Gad enzyme. The two isoforms of this enzyme are Gad67 and Gad65, encoded by the gad1 and gad2 genes respectively. Like mammals, zebrafish have both known gad genes; however, our lab has recently found evidence for a gad1 paralog in zebrafish. Using the zebrafish model to study these three gad isoforms and the role of GABA signaling is ideal because the animal is transparent and develops ex utero. To further investigate the function of the gad genes and to elucidate the role of GABA signaling during development, we are using CRISPR/Cas9 for targeted mutagenesis. A gad1b -/- mutant has been created in our lab already and we continue working towards making additional novel alleles for the gad genes in the zebrafish through this process. By performing gel electrophoresis and sequencing, we can assay for CRISPR/Cas9 success in inducing mutations in these alleles. Electrophysiological recordings have shown that our homozygous mutant has shown increased and abnormal brain activity as compared to wild-type animals. These experiments can be utilized to address the question of how genetic manipulations in GABAergic signaling affect neural development and neurological activity.

The Effectiveness of US Congressional Committees

Brad Louis Williamson
Dr. Charles Bullock, Political Science, School of Public and International Affairs

Committees are known as where bills go to die, but which committee kills the most bills and are there institutional differences between committees? More research in this specific area of study would lead to a better understanding of the most prominent institution in Congress. Through data collection going back to 1999, this study aimed to operationalize each committee by the percentage of bills it was responsible for killing. I gathered data on every bill that was submitted in each congress and tracked which committee it was assigned to. From there, I noted where the bill ended in the legislative process: in committee, in another area (on the floor, Presidential veto, conference committee), or was enacted into law. I compiled the data and broke it down by committee, congress, which party controlled which chamber, and whether or not there was a unified government. A byproduct of this research was the ability to contrast the internal atmosphere of the Senate and House through the comparison between committees with analogous jurisdictions. Thanks to texts such as Fenno's *Congressmen in Committee*, I was able to analyze the results in the larger context of the parent chamber as a whole. I found that the committees dealing with tax policy often killed the most bills while both Appropriations Committees had the best chance of dying in other areas or signed into law. This data can be used to better understand the inner workings of Congress as well as measure the probability of success for future legislation.

Habitat Provision Associated with Environmental Flows

Joshua R Willis, CURO Research Assistant
Dr. Bill Tollner, Environmental, Civil, Agricultural, and Mechanical Engineering, College of Engineering

A comprehensive analysis of environmental flow schemes represents a key step in ensuring adequate water availability to meet increasing human needs while minimizing adverse impacts on aquatic ecosystems. This study investigates how several environmental flow methods affect habitat provision in the Middle Oconee River near Athens, Georgia. Historical discharge data are coupled with water withdrawal simulations for three common environmental flow types to examine trade-offs between ecological and social outcomes (i.e., habitat provision and water withdrawal, respectively). Hydraulic models are applied to translate hydrologic simulations into habitat suitability for three generic habitat types: shallow-fast, deep-fast, and shallow-slow. The availability and distribution of habitats are then analyzed with respect to increasing water withdrawal rates. Finally, we compare the utility of deterministic modeling approaches based on long-term average conditions relative to stochastic modeling approaches using frequency-weighted

outcomes. Our initial results for the Middle Oconee River show that percent-of-flow regimes are most conducive to providing deep-fast habitat while results are mixed for shallow-fast and shallow-slow habitat. Furthermore, our findings indicate that models based on average, annual discharge consistently overestimate total habitat. The analytical methodology and approach set forth in this paper is significant in that it may be easily adapted to inform environmental flow analyses at other study sites.

Environmental Conditions That Activate the *E. coli* RNA Repair Operon

Andrew Charles Wise, CURO Research Assistant
Dr. Anna Karls, Microbiology, Franklin College of Arts and Sciences

Escherichia coli contains within its genome a putative RNA repair operon consisting of two genes, *rtcBA*; RtcB is an RNA ligase, while RtcA is a nucleotide phosphate cyclase. The operon is tightly regulated under the control of a σ^{54}-dependent promoter that requires activation of RtcR, a bacterial enhancer binding protein, in order to initiate transcription; the specific signal that activates transcription is as of yet unknown. The purpose of this research is to determine environmental conditions under which the operon is expressed. This will be accomplished by creating a reporter strain using λ-Red recombination to replace *rtcB* with a *xylE*-Kan^R reporter fusion, which will allow us to distinguish when the operon is being transcribed. Using the reporter strain, we will test different conditions to determine which stressor(s) initiate expression of the operon, including those that are known to cause nucleotide damage or affect the ability of ribosomes to carry out translation. Determining which conditions activate the operon will provide vital information toward elucidating the specific molecular signal that activates RtcR. Additionally, the results in *E. coli* will be compared to those in *Salmonella* Typhimurium, which contains additional genes within the operon (*rsr-yrlBA-rtcBA*). Preliminary research suggests that, despite significant homology between the two species, the operon is activated under entirely different conditions. Overall, this project will further our understanding of the physiological roles for RNA repair in bacteria.

The Ugly Duckling Narrative: Identity Development in Multiracial Individuals

Taylor Withrow, CURO Honors Scholar, CURO Research Assistant
Dr. Valerie Babb, English, Franklin College of Arts and Sciences

Race has been a central factor in the development of society for hundreds of years, particularly in the creation of a social structure defined by a person's race or ethnicity. The power of race lies in its ability to segregate and isolate groups of differing races. However, racial mixing and the presence of multiracial individuals weaken this power because they prove racial barriers can be broken. As we rapidly move towards a more mixed world, it is becoming more important to understand these individuals who live on the border between races. The intriguing aspect of multiracial individuals is how the external environment, specifically society's objection towards racial mixing, can significantly impact the identity growth of multiracial peoples. Accordingly, this research focuses on how multiracial people develop identity in a society built upon racial segregation. To answer this question, past theories on multiracial identity growth and the depiction of multiracial characters in literature were examined to isolate patterns of identity development. Several different forms of identity development were isolated, indicating there is not one single process for identity growth but various processes all dependent on the individual's characteristics, experiences, and environments. Recently, there has been a shift toward the idea that race cannot be used as a legitimate tool for classification or categorization and at the forefront of this shift is the multiracial individual; therefore, understanding multiracial identity struggle and growth is key to understanding the evolving state of race perception and race relations in society today.

Effect of the Female Frequency on the Pollen Dispersal Distance in Natural Populations of the Wild Geranium, *Geranium maculatum*

Ariane Wong, CURO Research Assistant
Dr. Shu-Mei Chang, Plant Biology, Franklin College of Arts and Sciences

When a male-sterile mutation occurs in a hermaphroditic population, it can turn the population into one that is composed of both female (or male-sterile) and hermaphroditic genotypes, named a gynodioecious population. An increase of females in a gynodioecious population can subsequently select for an increase of male function in the hermaphroditic individuals, which can increase in the likelihood of a female-sterile (male) mutation occurring in a population, and eventually resulting in the evolution towards a dioecious system that contains separate male and female individuals. To test this theory, studies have been done that observe male function in hermaphrodites with increasing population female frequency. However, female frequency calculated at the entire population level may not be the best predictor for the pattern of selection in nature. This is because gynodioecious populations show spatially structuring of the sexes where females are often clustered in one portion of the population and pollen dispersal is often limited in distance in natural populations. In other words, female frequency in a population as a whole may not be a good representation of mating potentials since hermaphrodites that are surrounded by a cluster of females may experience different effects of mating behavior than those farther away from females. Instead, female frequency at the subpopulation-level, defined by the distance of pollen dispersal, could be a more accurate measure of mating potential for a given plant within the subpopulation. This study aims to test this hypothesis by estimating the distance of pollen dispersal by comparing the shared paternity between seeds of paired maternal individuals. I used DNA extraction, PCR amplification, and genotyping to obtain genetic data for seeds collected from maternal plants whose locations were mapped in 4 populations of *geranium maculatm*. Results from a preliminary study completed in the fall 2016 showed that populations with females have a lower average pollen dispersal distance than those that contain only hermaphroditic individuals. Continuing research will work to test male fitness as a result of female frequency in subpopulations defined by pollen travel distance.

Developing a Sub-Viral Particle Dengue Vaccine Using Computationally Optimized Broadly Reactive Antigen (COBRA) Technology

Dianna Wong, CURO Research Assistant
Dr. Ted M Ross, Infectious Diseases, College of Veterinary Medicine

Dengue is a mosquito-borne *Flavivirus* that causes dengue fever, which predominantly causes mild symptoms but can progress in severity and ultimately develop to lethal dengue hemorrhagic fever. The endemic is worldwide with less than half of the world's population susceptible to infection with limited treatment available. The virus has four serotypes and is sensitive to variability proving it difficult to develop a tetravalent vaccine. Computationally optimized broadly reactive antigen or "COBRA" technology addresses the antigenic diversity of each serotype by using global surveillance efforts to generate a consensus of sequence of the surface. Sequences to make chimeric E proteins can be generated by switching regions that elicit neutralizing antibodies representing different serotypes. The regions DIII and Hinge were chosen to make DENV1-DENV3 and DENV2-DENV4 sequenced chimeras. Recombinant sequences of the E protein are used to make subviral particles for the serological detection of antibodies in mice. This study describes how chimeric sequences using COBRA methodology are implemented through bacteria in a DNA purification system for subsequent use for harvesting subviral particles.

Indecent: The Show That Shut Down on Opening Night

Lukas Woodyard
Dr. Frances N Teague, Theatre and Film Studies, Franklin College of Arts and Sciences

This paper considers the reception of a lesbian kiss on stage, and what that reception tells us about American attitudes toward gender and sexuality in popular culture. In 1923, *God of Vengeance* by Sholem Asch was shut down due to indecency on their opening night when the American public first viewed the lesbian kiss. The second production was far more successful. The Jewish Repertory Theatre revived the show in 1992 and did better than the original production probably due to the loss of the shock value of the show. Most recently, Asch's play was revived by La Mama E.T.C. at the end of 2016. This

production precedes another work: the Pulitzer-Prize-winning Paula Vogel, a queer feminist playwright is premiering her new work *Indecent*, a play about the first production of Asch's *God of Vengeance*. Since the play will not open until April on Broadway and not be published until August, this study will focus on the reception of the three productions of Asch's play and the reception of earlier productions of Indecent (at Yale Repertory Theatre and at Vineyard Theatre).

Hydrophilic Top Coat on Nitric Oxide-Releasing Surfaces for Enhanced Antibacterial and Antifouling Properties

Christina Workman, CURO Research Assistant
Dr. Hitesh Handa, Chemical, Materials, and Biomedical Engineering, College of Engineering

Healthcare-associated infections have resulted in rising numbers of deaths and medical costs in the United States. A majority of these infections stemmed from opportunities provided by medical implants and surgical wounds. Implanted medical devices provide surfaces for proteins from body fluids to bind, leading to bacteria aggregation and platelet activation. Biomedical grade polymers that involve the incorporation of nitric oxide (NO), an antimicrobial agent, are being investigated to reduce the risk of infection. While the results have been widely successful in reducing the incidence of infection it has been discovered that NO-releasing surfaces consequently increase protein absorption to these surfaces. This research worked to prevent protein absorption on these surfaces by incorporating hydrophilic polymers as a topcoat to NO-releasing surfaces. Four different polymers, three thermoplastic polyurethanes and a silicone elastomer were evaluated for their surface characteristics, affinity towards protein and viable bacteria absorption. These traits were measured using methods such as spectroscopic ellipsometry, chemiluminescence NO analyzer and atomic force microscopy (AFM) to identify which polymer exhibited the most hydrophilic properties. Highly hydrophilic polymers, such as SP60D60, form hydration layers on their surface, protecting the surface from protein adhesion. The formation of a hydration layer can be attributed to low surface roughness, as identified with AFM scans. The antifouling property of SP60D60, top coated on a NO-releasing film provided a synergistic effect of reducing viable bacteria by 95.83% compared to the control and protein adhesion was minimal, as measured by change in thickness of the SP60D60 films (2.24±0.68 nm).

Studying the Effects of Valsartan on *Daphnia magna*

Alyson Ming Wright, CURO Research Assistant
Dr. Ford Ballantyne, Ecology, Odum School of Ecology

As pharmaceuticals constantly enter the environment, aquatic organisms are chronically exposed to these potentially harmful compounds. A small aquatic invertebrate, *Daphnia magna* play a key role in the freshwater ecosystem as important herbivores that help determine water quality and serve as crucial sources of food for many fish. Studying the effects of pharmaceuticals on *D. magna* is critical to gain an understanding of how they disrupt development and life history characteristics and to preserve the dynamics of freshwater ecosystems. Valsartan, a drug typically used to treat high blood pressure in humans, was found in the highest concentrations around United States water treatment facilities and its affects on daphnia are unknown. In this study, *Daphnia* were exposed to various concentrations of valsartan that reflect concentrations found in the environment. Development and life history traits of *Daphnia* were analyzed to see the effects. It is expected to find physical deformities, a reduced rate of fecundity, and a slower maturation rate across all treatment levels compared to the control.

Investigation of the Effectiveness of Geosynthetics in North Georgia Soils

Jason Christopher Wright, CURO Research Assistant
Dr. S. Sonny Kim, Environmental, Civil, Agricultural, and Mechanical Engineering, College of Engineering

This study will a large specimen, 6' x 6' accelerated model, in conjunction with numerical modeling in order to determine the effectiveness of geosynthetics as a reinforcing material in the between the base course of pavement and the subgrade using different soil types of Georgia. There have been several studies investigating this but very few investigate the relationship of full

scale testing data with numerical finite element modeling. For this study, finite element analyses will be conducted using ansys. The model will include both the graded aggregate base (GAB) and subgrade soils to determine the vertical stress and horizontal strain numerically. There will be several different subgrade soils tested from varying parts of the state of Georgia in order to determine the effects of the base layer, subgrade layer and geosynthetic. In conjunction with the numeric modeling, a large scale test will be performed with each of the different subgrade soils with different geosynthetic reinforcements. From the accelerated lab testing the experimental vertical stress and horizontal strain will be extracted. This data will then be compared with the FEM data in order to produce a more accurate and reputable relationship between the two to provide recommendations to the Georgia Department of Transportation (GDOT) for the six different subgrade soils. The results of the numerical modeling and large scale test will be used to develop a Mechanistic-Empirical Pavement Design for the use of geosynthetics in North Georgia soils by GDOT. It is expected that the soil used in conjunction with the geosynthetic will perform better than the test specimen with no geosynthetic.

Educational Disparities between Rural and Urban Schools in the State of Georgia

Victoria Ayse Yonter, Foundation Fellow
Dr. Josh Kinsler, Economics, Terry College of Business

Disparities between K-12 education in metro and non-metro counties were found in the state of Georgia. Linear regression analysis was used to measure the differences in outcomes, with test scores as the measureable outcomes. Demographic controls including income, race, and education levels of the counties were used as controls and tested as explanatory variables. Determining the causes of the achievement gap among rural schools will help policies be crafted that can effectively alleviate these gaps. The effectiveness of the federal Rural Education Achievement Program was tested using difference-in-differences model. Testing the effectiveness of existing programs is important to improve these programs and encourage more successful future initiates. This paper hopes to address and describe the differences in rural and urban education, using Georgia as evidence, and test current efforts aimed at lessening these differences.

The Role of Chondrogenic Growth Factors in the Pathogenesis of Equine DSLD

Madeline Young, CURO Research Assistant
Dr. Jaroslava Halper, Pathology, College of Veterinary Medicine

Equine Degenerative Suspensory Ligament Desmitis (DSLD) is a disease afflicting a wide range of horse breeds that often results in mortality. Little is known about the pathogenesis of the disease making diagnosis and treatment of the affected horses difficult. Our lab has shown that the key histopathological sign of DSLD is an abnormal buildup of proteoglycans within connective tissue throughout the body with Safranin O staining which indicates the proteoglycan's sulfation. Additionally, at least one of the tendon proteoglycans, decorin, is abnormal in horses with DSLD, with chondroitin sulfate replacing the normal dermatan sulfate. The purpose of our current research has been to explain the abnormal levels of the proteoglycans by investigating the levels of the chondrogenic growth factors Bone Morphogenetic Protein 2 (BMP-2) and Transforming Growth Factor β1 (TGFβ). These growth factors regulate the production of proteoglycans by binding to the dermatan sulfate in decorin to suppress further production of the proteoglycans. When the dermatan sulfate is replaced with the chondroitin sulfate we believe the growth factors are unable to bind to the decorin which stimulates further production of proteoglycans by the tendon cells. Through immunohistochemistry staining, abnormally high levels of BMP-2 were found to be correlated with the overproduction of the proteoglycans and cellular activity. Interestingly, the levels of TGFβ were found to be low. Finding higher levels of the BMP-2 correlated with abnormally high levels of proteoglycans supports our hypothesis that growth factors are unable to bind to the altered decorin and could be leading to the progression of DSLD.

Pedagogical Methods for Developing Empathy in Engineering Students

Kathryn Marie Youngblood, CURO Research Assistant
Dr. Jo Walther, Environmental, Civil, Agricultural, and Mechanical Engineering, College of Engineering

Among the variety of design talents and technical expertise expected of engineers, recent critiques of engineering work have challenged problem-solvers to more closely examine the social contexts and consequences of their work. This challenge demands that engineers of the future be trained to empathetically interact with a diversity of stakeholders. The socially-situated and interdisciplinary nature of the grand challenges of the modern world necessitates a socially conscious engineer and one who integrates empathy into their professional way of being. There has, however, been little exploration of methods by which to cultivate empathy as part of the professional development of engineering students. Based on previous work establishing the utility and application of empathy, this research entails the development of a pedagogical intervention for fostering empathy in an engineering setting through skill building exercises and role play. Qualitative analysis of student reflections on these experiences reveals a wide range of understandings of empathy as it applies to professional practice and as a way of being, in addition to illuminating elements of engineering culture that may be detrimental to the empathetic development.

Long-Term Population Dynamics Pre-Die Off of the Vermetid Gastropod, *Ceraesignum maximum*, in Mo'orea, French Polynesia

Margaret Zacharias
Dr. Craig W Osenberg, Ecology, Odum School of Ecology

Coral reefs form some of the world's most productive ecosystems, but corals are currently threatened by physical and biological stressors. One of these stressors, *Ceraesignum maximum*, is a vermetid snail, which can densely populate coral reefs and are known to decrease coral survival, growth, and photosynthetic yield. Although these snails are a known stressor, not much is known about the ecology and biology of these snails. In 2015-2016, vermetid populations experienced an unforeseen, massive die-off throughout French Polynesia. To better understand vermetid population dynamics and recognize if there were warning signals for the die-off, we analyzed an 11-year time series (2006-2016) of photographs from Mo'orea, French Polynesia to quantify snail density and size structure as well as live coral cover. Photographs were taken annually at 6 different sites around the island, with 100 photographs per site. Results indicate that vermetid populations increased at an average rate of 0.29% $year^{-1}$ from 2006-2015, and areas with higher vermetid densities have lower coral cover. There appeared no warning of a population crash. While other factors may have led to the coral decline, we predict that the vermetid population crash will lead to increases in live coral cover. Future work will examine the correlation between different coral species and vermetid densities, as well as how size structure of the populations has changed over time. These data will help us to better understand dynamics of populations before massive die off events.

Exploring Grief: Accompanying End of Life Support with Palliative and Bereavement Care

Amy Zhan, CURO Research Assistant
Dr. Toni Miles, Epidemiology and Biostatistics, College of Public Health

With a cohort of nearly 50 million, Boomers quickly approaching their older years, aging is one of the most significant public health trends to monitor in coming years, along with the growing realization that our current models of end-of-life-care and bereavement management have major shortcomings. Death and dying will be experienced by millions of families across the United States, with few mechanisms in place to address the needs of those left behind. This research seeks to find effective means of supporting resilience and restructuring policies to renovate hospice care in order to restore good health for surviving family members and loved ones. Can we create policies to restore health following bereavement? A lack of clear evidence regarding the effects and nature of bereavement results in an inability to guide the development and allocation of bereavement programs, and the findings will have the potential to inform the

capacity and effectiveness of services and community organizations that are able to care for individuals who are bereaved, according to their needs. Palliative care is incomplete without bereavement training, and our work seeks to incorporate these aspects of care to create more efficient patient-centered care in nursing homes and hospice settings. We will be conducting interviews with health care providers and hospice residents, and compiling quantitative and qualitative data to support our findings. Such studies are essential for achieving equitable resource allocations within our health system and providing cost-effective measures with beneficial health outcomes for all.

Olympic Performance and Propensity for Interstate Conflict

Jonathan Zot Sr.
Dr. Andrew Owsiak, International Affairs, School of Public and International Affairs

Does a negative performance at the Olympic Games affect the aggressiveness of states that invest heavily in the international competition? Considering the sizable financial inputs of states, the widespread viewership of the events, and the opportunity for international leveraging, it is rational to assume that state governments are aware of the spectacle's political salience. With such high stakes, a significantly poor performance would be dissatisfying to both a government and its citizens. This paper explores aggressive foreign policy adoption in response to pervasive public discontent following Olympic underperformance, employing Diversionary War Theory as the state government's motivating factor. I observe the relationship between the two relevant aspects that encompass a state's overall experience: outcome and investment. Outcome was the difference between the final medal count and a count predicted by leading experts. To establish a baseline for Olympic potential, I developed a novel approach that uses each state's GDP per capita share to determine an unbiased medal count. This count was contrasted to the leading prediction to estimate investment. From these variables, I isolated a group of underperformers with high investments. In the period immediately following the Olympics, the states investing more in the games initiated a greater average number of Militarized Interstate Disputes than their low-investing counterparts when faced with Olympic underperformance. To further establish a link between Olympic performance and interstate aggressiveness, I plan to incorporate data from other Olympic years. This will offer empirical research supporting the political relevance of the event.

Index

Index

Index

Index

Index

Index

Index

Index

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